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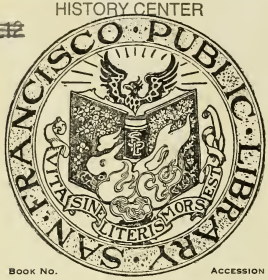

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A STUDY OF 2739 CASES OF TUBERCULOSIS REPORTED TO THE SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH DURING 1934, 1935 and 1936

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Report to the San Francisco Department of Public Health on Project #3724 Conducted Under the Auspices of the Works Progress Administration

Sponsor's Representative - Dr. George H. Becker
Project Supervisor - Frances Moore

San Francisco, California
October, 1937

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Acknowledgment

The author wishes to express her sincere thanks to the Works Progress Administration for financing this study and to the San Francisco Department of Public Health through whose interest the study was made possible. Dr. James Sharp of the California Works Progress Administration gave generous assistance in the technical phases of the report, and many valuable suggestions were received from staff members of the San Francisco and the California Tuberculosis Associations. The carrying out of the work was made possible by the unfailing cooperation of Dr. George H. Becker, Director of the Bureau of Communicable Diseases. Among the many agencies and individuals who contributed to the study, especial mention must be made of the personnel assigned to the project by the Works Progress Administration.

Frances Moore
November, 1937

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I INTRODUCTION

During the period from 1900 to 1936, the tuberculosis death rate in San Francisco dropped from 330 to 67 per 100,000 population. Great though this decline has been, in 1936 tuberculosis still ranked fourth as a cause of death in San Francisco. Heart disease, cancer and nephritis caused more deaths, but most of such deaths occurred after the age of 60. Tuberculosis attacked persons between the ages of 15 and 45, that is, persons who are in the age group generally considered economically productive. For the individual, for his family and for the community, tuberculosis is probably the most costly of all diseases.

Purpose of the Study:

Though the campaign against tuberculosis has been waged jointly by voluntary and official agencies, the Health Department is ultimately responsible for directing and implementing the battle against this disease. The San Francisco Department of Public Health is intensifying its campaign against tuberculosis. The purpose of this study was to obtain information which would assist in furthering the program for the treatment and prevention of this disease in San Francisco by means of studying (1) the incidence of tuberculosis among different age and racial groups; (2) the social conditions existing in exposed families; (3) the health services received by persons having tuberculosis.

Scope of the Study:

The group selected for study was all persons who, for the first time during the years 1934, 1935, and 1936, were reported to the San Francisco Department of Health as having tuberculosis. The advantages to be

derived from enlarging the size of the sample by including cases of tuberculosis reported prior to 1934 were offset by the difficulties involved in obtaining accurate information concerning cases reported many years before the survey was initiated. 438 cases reported during 1934-36 were excluded from the survey after preliminary investigation. The basis on which these exclusions were made is discussed in Appendix 2. The 2739 cases followed by the survey, providing the present system of reporting continues, are representative of those persons in San Francisco toward whom the program of tuberculosis control must be directed.

Method of Investigation:

A questionnaire was filled in for each person in the group selected for study. Information was obtained from existing records on file in agencies and institutions affiliated with or under the jurisdiction of the San Francisco Department of Public Health; from social agencies; from private physicians; and from private institutions. A detailed description of the method of investigation and a copy of the schedule appear in Appendix 1. No attempt was made to obtain information by interviewing the persons under study. It was believed that such an attempt might react adversely on the efforts of the Health Department to stimulate the reporting of tuberculosis and to develop a cooperative relationship with persons requiring supervision from the Department. Furthermore, Works Progress Administration regulations discourage interviewing private individuals.

General Characteristics of San Francisco

Location and Description:

San Francisco has an area of 42 square miles and altitudes ranging

from sea level to 965 feet. Situated on a peninsula with San Francisco Bay on one side and the Pacific Ocean on the other, the city has considerable fog and dampness. The climate is otherwise favorable, being free from excessive precipitation or extremes of temperature.

Population:

The population of San Francisco has grown rapidly. The 634,394 persons enumerated in the 1930 Census were almost twice the total reported by the 1900 Census. During the decade 1920-30 alone there was a population increase of over 25 percent. There are indications, however, that the rate of increase since 1930 has been less rapid.

Compared with 1920, the San Francisco population in 1930 had a larger proportion of the total aged 40 years or over, and a smaller proportion under 20 years of age. In 1930 there was a noticeable difference between the age distribution of San Francisco's population and that of the twelve other cities having more than 500,000 inhabitants. San Francisco had relatively fewer persons under 20 years of age, a larger concentration in the age group 20-55, and a slightly smaller proportion of the total aged upwards of 55 years. Though San Francisco's non-white population is distinguished by the large number of Chinese, in 1930 all non-white races formed a smaller proportion of the total population (6.2 percent) than was also the case in eight of the thirteen largest American cities. In 1930, only five of these cities had a higher proportion of all white persons who were of foreign birth than did San Francisco with 26 percent.

In addition to the composition and characteristics of resident persons, three other factors relating to population affect the public health program in this city. A large and constant migration of people into and

away from San Francisco is a concomitant of its position as a major terminal for water and land transportation. The rich agricultural areas near San Francisco attract thousands of migratory laborers for seasonal work, and many single men live in this city between periods of employment. San Francisco's position as the hub of the large urban area surrounding San Francisco Bay is a third factor influencing the city's health program. The economic integration of this area results in a constant movement of people across county lines. An example of this is found in the thousands of persons who daily commute between San Francisco and Oakland. Thus, to a considerable extent, the public health problems of the several counties in the Bay area are interdependent.

Economic Characteristics:

The core around which San Francisco's economic life has developed is its position as the principal seaport of the West Coast. This position as a focal point for the movement of freight and passengers has been a vital factor in influencing the pursuits followed by the city's employed population. It has resulted in an occupational distribution somewhat different from that prevailing in the twelve other cities which had 500,000 or more inhabitants in 1930. According to the Census taken that year, of the total number of persons employed in San Francisco a distinctly smaller proportion was engaged in manufacturing and mechanical pursuits than was also the case in these other cities. Relatively larger numbers were occupied in trade and in clerical work. Of these cities, San Francisco had the highest percentage engaged in domestic and personal service as well as in transportation and communication.

Tuberculosis Death Rate:

In 1900 the tuberculosis death rate in San Francisco was 330 per 100,000 population, which was considerably higher than the rate of 201 for the United States as a whole.[1] From 1900 to 1934 San Francisco made tremendous progress in controlling tuberculosis. In 1934 the rate of 66 deaths per 100,000 population was but slightly in excess of that for the nation and only eighteen of forty-six large American cities had lower rates.[2] Since 1934 the decline in the San Francisco rate has been halted, that of 67 in 1936 being in excess of that for 1934 and 1935.[3] There is evidence that the decline in the rate for the United States in 1936 also was checked.[4]

1/ U. S. Bureau of the Census, 1900-1904, Mortality Statistics, pps. ixvii and cviii.

2/ Drolet, G. J., N. Y. Tuberculosis and Health Association, preliminary release, 1937.

3/ San Francisco Department of Public Health, Summary of Vital Statistics, January 18, 1937.

4/ Metropolitan Life Insurance Company, Statistical Bulletin, April, 1937, p. 1.

II SUMMARY OF FINDINGS

The findings presented in this section refer only to San Francisco and are based on a study of the 2739 cases of tuberculosis reported during the years 1934-36.

1. Until 1934 there was a marked decline in the tuberculosis death rate in San Francisco. Since 1934, i. e. during the depression years, this decline is no longer evident; therefore, expansion of the program for treating and preventing this disease seemed necessary. (Page 5)
2. The data studied indicate a need for stimulating more accurate differentiation between reporting of childhood type tuberculosis as contrasted with adult type tuberculosis in childhood. (Page 16)
3. The increase in the number of cases reported during 1936 over the number reported during 1934 for the most part represents an increase in the reporting of childhood type tuberculosis, (Page 18) (Required since 1936 by the State Department of Health).
4. The data indicate the existence of unreported and unrecognized cases of tuberculosis in San Francisco. Intensification of case finding was indicated as a first step in the further control of tuberculosis, especially among non-whites. (Page 20)
5. Case rates conform with death rates in indicating that the incidence of tuberculosis is greatest among Negroes and next greatest among the Chinese. The tuberculosis mortality rate for Negroes is five times that for whites; the rate for the Chinese is three times that for whites in San Francisco. (Page 21)

6. High incidence of tuberculosis among Mexicans is indicated by morbidity reports. Deaths do not accurately reflect incidence in this racial group because Mexicans are frequently returned as white on death certificates. (Page 21)

7. Tuberculosis in San Francisco is to a large extent a local problem. Only 7 percent of the cases reported during the years 1934-36 had lived in the city less than one year prior to the time of report. (Page 25)

8. The fact that those sections of San Francisco having the highest tuberculosis case rates during 1934-36 are the same sections which had the highest tuberculosis death rates in 1925 indicates the necessity for a special program of tuberculosis control in those sections: the areas are within the 22nd, 30th and 33rd Assembly Districts as they were delineated in 1930. (Page 25)

9. Among the 1644 cases domiciled with other persons, one or more other individuals were tuberculosis cases in 17 percent of the households. This indicates the importance of adequate facilities for isolating tuberculosis cases. (Page 29)

10. Under existing conditions, persons reported for tuberculosis in San Francisco have only approximately an even chance of being alive two years after the time of report. As of February 15, 1937, the number recorded as dead from tuberculosis was: 41 percent of cases reported during 1934; 36 percent of those reported during 1935; 28 percent of those reported during 1936. (Pages 31 & 32)

11. The existence of unrecognized cases of tuberculosis in San Francisco is indicated by the fact that 64 percent of the 951 deaths occurred either before first report or less than one month after first report for tuberculosis. (Page 39 & 40)

12. 29 percent of the cases who died at the San Francisco Hospital were not reported for tuberculosis until after death; 72 percent of those who died at home and 78 percent of those who died in private hospitals were similarly unreported. This indicates that private physicians fail to report cases of tuberculosis more frequently than do municipal institutions. (Page 40)

13. Case finding, facilities for field nursing service and facilities for institutional care were, during the period studied, below the standards set by the National Tuberculosis Association as necessary for the treatment and prevention of tuberculosis. Clinic facilities measured above the standard set by the National Tuberculosis Association. (Pages 53, 55 & 56)

14. Medical examination of all household contacts was not recorded for 52 percent of the 1644 cases reported to be domiciled with other persons. (Page 60)

15. Among the 2739 cases reported during 1934-36, 809 were recorded as resident in San Francisco in February, 1937. An additional 447 were in institutions. 79 percent of the former and 87 percent of the latter were dependent on the Health Department for medical care. (Pages 64 and 66)

16. The importance of hospitalization of infected persons as a tool in preventing the spread of tuberculosis as well as in its therapy is indicated by the fact that the housing conditions recorded for approximately one-third of the cases made isolation of the patient at home impossible. (Page 77)

17. High incidence of tuberculosis among persons engaged in occupations usually accompanied by a low standard of living is indicated by the fact that 55 percent of the 1680 cases for whom a gainful occupation was recorded had been engaged in unskilled or semi-skilled work. (Page 73)

18. Since 20 percent of the 1680 cases for whom a gainful occupation was recorded had been employed at service occupations included in the category "servant class"; therefore the need for special attention to the control of tuberculosis among all employees whose work brings them into close contact with people is indicated. (Page 74).

19. The relief history of reported cases indicated that 42 percent of the 2739 cases reported during 1934-36 had at some time received material relief from a welfare agency in San Francisco. An additional 40 percent had been dependent on welfare agencies for assistance with social, health, or other problems. (Page 77)

20. The occupational background of cases of tuberculosis reported during the years 1934-36 coupled with the extent to which these cases were dependent on welfare agencies indicates that they were unable to finance their own

treatment for tuberculosis. If medical treatment for these cases and preventative supervision for their contacts is provided then they will represent controlled sources of infection. If such aid is not adequately provided then these low income tuberculosis cases become a specially fertile source of community infection. (Page 80)

III THE INCIDENCE OF TUBERCULOSIS IN SAN FRANCISCO

Type of Disease

Tuberculosis, a communicable disease, is acquired chiefly from persons who have tubercle bacilli in their sputum. Childhood type tuberculosis is essentially different from pulmonary tuberculosis of the adult type. It is a first infection with tubercle bacilli involving the lungs and associated tracheo-bronchial glands. Childhood type tuberculosis does not itself cause death though under unfavorable conditions it may progress to another form of tuberculosis and then terminate in death. Adult type tuberculosis is much more serious than "childhood type tuberculosis." It requires medical treatment over a period of years. Childhood type tuberculosis and adult type pulmonary tuberculosis may occur in persons of any age, though the former usually appears only in children.

Most States have laws requiring registration of tuberculosis cases but, as Miss Whitney has shown, there is some question as to whether "childhood type tuberculosis" is officially tuberculosis.[1/] Because of the essential difference between the two types of the disease, the significance of statistics on the incidence of tuberculosis is conditioned by whether primary infection cases are included in the analysis. In San Francisco, childhood type tuberculosis is reportable. However, as Miss Whitney also pointed out, there is a tendency to confuse "childhood type tuberculosis" with "tuberculosis in childhood." The report cards in San Francisco indicate that it is no more free from this confusion than are other cities and states. Frequently,

1/ American Journal of Public Health, Vol. 24, August, 1934, p. 850.

however, case history data available from the field nursing division and from the municipal tuberculosis clinics clarified the diagnosis indicated on the original report card.

2739 cases of tuberculosis were reported in San Francisco for the first time during the years 1934, 1935 and 1936. 392 reports were for childhood type tuberculosis. All but 13 of these were for persons less than 15 years old, and none was in an age group upward of 20. This form of the disease accounted for 84 percent of all reports of children aged less than 15 years. If childhood type cases are deducted from all reports for persons under 15, pulmonary tuberculosis of the adult type accounted for 36 percent of the remaining reports, and "other" forms of tuberculosis contributed 64 percent. The relative importance of "other" forms of tuberculosis among all cases under 15 years, and particularly among those under 5, is in conformity with data disclosed in studies of tuberculosis mortality. 2/

Table 1 - Type of Disease at Specific Ages for Cases Reported, 1934-36 .

Age in Years	Type of Disease							
	All types		Adult Type Pulmonary		Childhood Type		Other Types	
	No.	%	No.	%	No.	%	No.	%
All ages	2,739	100.0	2,169	79.2	392	14.3	178	6.5
Under 15	452	100.0	26	5.7	379	83.9	47	10.4
15 to 24	414	100.0	377	91.1	13	3.1	24	5.8
25 to 34	564	100.0	525	93.1	-	-	39	6.9
35 to 54	911	100.0	863	94.7	-	-	48	5.3
55 and over	390	100.0	370	94.9	-	-	20	5.1
Unknown	8	100.0	8	100.0	-	-	-	-

2/ Whitney, Jessamine, New and Supplementary Facts and Figures About Tuberculosis, National Tuberculosis Association, 1935, p. 39, Metropolitan Life Insurance Company, the Mortality from Tuberculosis, 1935, p. 8.

Non-pulmonary forms of tuberculosis accounted for a smaller proportion of the cases followed by the survey than has been true in various studies of tuberculosis mortality.[2/] Excluding childhood type cases, 92 percent of all reports were for pulmonary tuberculosis compared to 90 percent or less obtained in mortality studies. At least a partial explanation of this difference may be found in the fact that in the survey cases reported as having both a pulmonary and a non-pulmonary form of tuberculosis were classified as pulmonary. The fatality rate has been found to be higher among non-pulmonary cases than among pulmonary. This, also, would explain the greater frequency of "other" forms of tuberculosis in mortality reports as compared with morbidity reports.

Age and Sex

Examination of the age distribution of cases of tuberculosis reported in San Francisco during 1934-36 lends further support to a fact which has been disclosed by studies of mortality; namely, that this disease attacks persons when they are in the age period usually the most productive for the individual and for the community. Over half of all cases reported were between the ages of 25 and 54.

The high incidence of the disease during young adulthood and middle age is even more marked among males than among females. The latter are outnumbered by almost two to one. Almost one-half of all reports for females were for individuals under 25 years of age, whereas less than one-fourth of all males reported were included in this age group. These differences between

2/ Whitney, Jessamine, New and Supplementary Facts and Figures about Tuberculosis, National Tuberculosis Association, 1935, p. 39. Metropolitan Life Insurance Company, The Mortality from Tuberculosis, 1935, p. 8.

male and female reports for tuberculosis conform in general to those disclosed by studies of tuberculosis mortality. Morbidity reports indicate that peak incidence among females in San Francisco occurs at an age slightly older than that disclosed in some mortality studies.

Table 2 - Age and Sex of Cases Reported, 1934-36

Age in Years	Year Reported, 1934 - 1936			1934	1935	1936
	Both Sexes	Male	Female	Both Sexes	Both Sexes	Both Sexes
All ages	2,739	1,741	998	844	934	961
Under 15	452	211	241	123	153	176
15 to 24	414	180	234	137	135	142
25 to 34	564	321	243	166	223	175
35 to 54	911	711	200	292	304	315
55 and over	390	314	76	122	119	149
Unknown	8	4	4	4	-	4
			Percent			
All ages	100.0	63.6	36.4:	100.0	100.0	100.0
Under 15	100.0	46.7	53.3:	14.6	16.4	18.3
15 to 24	100.0	43.5	56.5:	16.2	14.4	14.8
25 to 34	100.0	56.9	43.1:	19.7	23.9	18.2
35 to 54	100.0	78.0	22.0:	34.6	32.5	32.8
55 and over	100.0	80.5	19.5:	14.4	12.8	15.5
Unknown	100.0	50.0	50.0	.5	-	.4

The sex distribution of cases of tuberculosis reported in San Francisco during 1934-36 conforms in general to the sex distribution of the 1368 tuberculosis deaths occurring in the city during the same period, but distinct differences appear in the age distribution. After excluding the 392 cases of childhood type tuberculosis from consideration, it is found that children under 15 years contributed a smaller proportion of all cases reported than of all deaths reported. First, this difference between reported cases and deaths may

be a reflection of the fact that cases of tuberculosis diagnosed in young children are characterized by rapid development of the disease and a high proportion of fatalities. Secondly, the 379 persons under 15 years classified as having "childhood type tuberculosis" may in reality include some cases of adult type pulmonary disease. Underreporting of cases of tuberculosis in young children is still a third factor which may account for the relatively small proportion of all reported cases of adult type disease included in the age group under 15 years. (Here, and throughout this study, the term "underreporting" is intended to include unrecognized cases of tuberculosis as well as diagnosed cases which have not been reported.) Persons between the ages of 15 and 34 contributed a larger proportion of all cases reported than of all deaths reported. Persons in each age group upward of 34 years contributed a smaller proportion of all cases reported than of all deaths. There are indications that tuberculosis in adolescents and young adults less frequently results in death, and that the interval between onset and death is longer than is the case among older persons. This being true, the age distribution of morbidity reports is probably more indicative of the real incidence of tuberculosis among persons in adolescence or young adulthood than is the age distribution of mortality reports. The representativeness of the latter is limited by the differential mortality rate experienced in specific age groups.

Case Rates and Death Rates:

Tuberculosis case rates for specific ages were computed by averaging the cases reported during the three years, 1934, 1935 and 1936, and obtaining the rate per 100,000 estimated population in 1935. Rates were computed in the same manner for all tuberculosis deaths occurring in San Francisco during this period. The death rate for persons in the city under

15 is higher than in the United States in 1932.[3] The influence of cases of childhood type tuberculosis on the morbidity rate for persons under 15 years of age is apparent from Chart I. When childhood type cases are deducted from all cases reported, the morbidity rate for persons under 15 years is lower than disclosed by other studies.[4] This, as well as the very sharp rise in the morbidity curve in the age group 15-19, may be the result of undifferentiated reporting of "tuberculosis in childhood" as "childhood type tuberculosis".

Whereas, the morbidity rate in San Francisco is fairly constant at all ages upwards of 20 years, the mortality rate rises steadily in successive age groups. The curve for death rates in San Francisco among persons over 25 years ascends more sharply and reaches a higher peak than does the rate curve for all tuberculosis deaths in the United States. The rapid rise in the death rate for persons aged 45 years or over to some extent represents the cumulation of deaths of persons reported for tuberculosis during childhood, adolescence and young adulthood. However, examination of the deaths occurring among those persons aged 45 years or more and followed by the survey indicates that the interval between report and death usually is short. This would seem to limit the importance which can be attributed to deaths among persons reported as cases at younger ages in accounting for the high death rate among persons 45 years of age and over. The sharp rise in the death rate, the high peak it reaches, the constancy of the case rate.

3/ Whitney, Jessamine, New and Supplementary Facts and Figures About Tuberculosis, National Tuberculosis Association, 1935, p. 9.

4/ Chadwick, H. D., American Review of Tuberculosis, 1927, Vol. XV, p. 601. Edwards, H.R., New England Journal of Medicine, 1935, Vol. 213, p. 760.

CHART I
TUBERCULOSIS MORTALITY AND MORBIDITY

Rates per 100,000 in each Age Group
San Francisco 1934-36

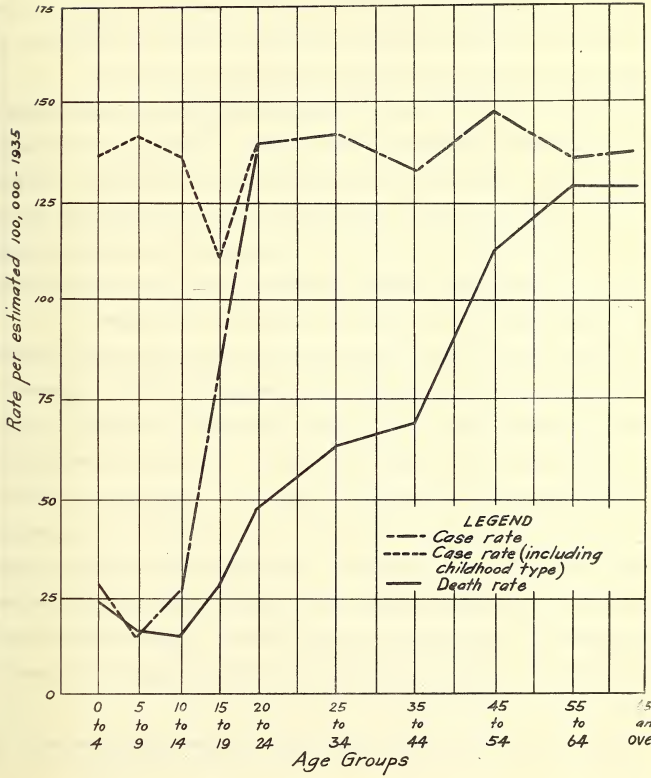


FIG. 17

and the short interval between report and death for deaths among persons over 45, all combine to indicate that under-reporting (or non-recognition) of cases of tuberculosis is probably most marked among middle aged and old persons.

Two new cases (excluding childhood type tuberculosis) per annual average number of deaths has been established as the standard for morbidity reports in tuberculosis.[5/] During 1934-36, the annual average number of deaths was 456; deductions for non-residents reduce this average to 412. Multiplying by two, the standard for case reporting would be 824 new cases per year. In San Francisco the annual average number of new cases reported, exclusive of childhood type tuberculosis, was 782 which is slightly below standard.

Comparison of the age and sex distribution of tuberculosis cases reported during each of the three years studied brings out only one distinct difference. In 1934, 10 percent of all reports were for persons 5 to 14 years of age. In 1935, the proportion in this age group was 11 percent; in 1936, it had risen to 15 percent. In 1936, total cases reported had increased by 117 over the 1934 total. 46 percent of this increase was concentrated in the age group 5 to 14 years and, for the most part, represents an increase in reports of childhood type tuberculosis. The fact that this form of the disease was not officially reportable until 1935, and the inauguration of a new Tuberculosis Control Program, including intensive epidemiological investigations, account for the marked increase in the reports of childhood type tuberculosis.

5/ National Tuberculosis Association, Appraisal Form for Local Tuberculosis Activities, 1936, p. 14.

Summary:

1. The significance of data concerning tuberculosis morbidity is conditioned, in many instances, on the segregation of reports of childhoodtype tuberculosis.

2. Morbidity reports probably are more indicative of the incidence of tuberculosis among persons in adolescence or young adulthood than are mortality reports because the representativeness of the latter is conditioned by the more favorable mortality experience of persons in this age group.

3. The reporting of new cases of tuberculosis in San Francisco during 1934-36 was lower than the standard established by the American Public Health Association. Under-reporting probably is concentrated among persons between the ages of 40 and 55.

4. The increase in the number of cases reported during 1936 over the number reported during 1934 is concentrated largely in the age group 5-14 years and, for the most part, represents an increase in reports of childhood type tuberculosis.

Race and Nativity

In Table 3 a distinct difference is apparent in the age distribution of cases reported from the white and non-white races. Every minor race exceeds the white race in the proportion of cases included in the age groups under 15. 39 percent of all Mexicans and of all Chinese were reported from this age group. In the general population in San Francisco the minor races have a relatively larger proportion of all persons aged under 15 years than is true of the white race, but this difference within the age distribution of the general population is not large enough to account for the marked concentration at younger ages of reports of tuberculosis from the minor races.

As was indicated previously, over 84 percent of all reports for

children were for childhood type tuberculosis. Cases diagnosed as having childhood type tuberculosis frequently are found to have been exposed to an individual having the active form of the disease. Reports of tuberculosis for non-white persons show a higher ratio of childhood type cases to all other cases (1:3) than do reports for white persons (1:8). If cases of childhood type tuberculosis represent leads to persons having the active form of the disease, then the high ratio of reports for childhood type tuberculosis to reports for all other forms found among non-whites may indicate more unrecognized cases of active tuberculosis among non-white persons than among whites. A much larger proportion of the adult cases reported from minor races during 1934-36 resulted in death than was true of the white cases. Presumably among the former the disease had progressed to a more advanced stage before the case was reported.

Table 3 - Age and Race of Cases Reported, 1934-36.

Age in Years	All races	Race or Color						
		White	Chinese	Japanese	Mexican	Negro	Other	Unknown
All ages	2,739	2,192	245	32	110	82	68	10
Under 15	452	285	95	5	43	12	10	2
15 to 24	414	315	49	11	16	13	10	-
25 to 34	564	442	43	4	15	21	35	4
35 to 54	911	782	48	8	28	28	13	4
55 and over	390	361	10	4	7	8	-	-
Unknown age	8	7	-	-	1	-	-	-
		Percent						
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Under 15	16.5	13.0	38.8	15.6	39.1	14.6	14.7	20.0
15 to 24	15.1	14.4	20.0	34.4	14.5	15.9	14.7	-
25 to 34	20.6	20.2	17.5	12.5	13.6	25.6	51.5	40.0
35 to 54	33.2	35.7	19.6	25.0	25.5	34.1	19.1	40.0
55 and over	14.3	16.4	4.1	12.5	6.4	9.8	-	-
Unknown age	.3	.3	-	-	.9	-	-	-

Variations in the racial incidence of tuberculosis have been disclosed in many studies of the mortality from this disease. Such racial differences in morbidity rates in San Francisco are apparent from Chart II.[6/] Because of the numerical insignificance of Negroes in San Francisco's population, the importance of this group as a factor in the city's tuberculosis problem is occasionally overlooked. Actually, the case rate among Negroes is the highest of all races. The Chinese, popularly supposed to be the group in San Francisco most affected by tuberculosis, have a case rate of 294 per 100,000 estimated population which is far lower than the Negro rate of 573. The Chinese, however, outnumber Negroes in the general population by more than four to one. Mexicans, approximately half the Chinese in number, have a case rate of 269. The rate for the Japanese is low in contrast with those of the other non-white races. In California the number of Japanese on relief relative to their number in the general population is small. By implication, their standard of health and housing is at least fair. It is estimated that in 1935 the minor races formed approximately 7 percent of the general population; they accounted for more than one-fifth of all cases of tuberculosis reported during 1934-36.

Comparison of statistics on cases of tuberculosis reported in San Francisco during the three years studied with statistics on deaths occurring during the same period is hindered by the uncertainty surrounding the classification of Mexicans. Deaths among Mexicans nominally are included with those among "other" races. On death certificates Mexicans frequently are reported as "white", are classified in this category, and thereby raise the

6/ Cases of childhood type tuberculosis were not included in computing morbidity rates for racial groups.

CHART II
TUBERCULOSIS MORTALITY AND MORBIDITY

Rates per 100,000 in each Racial Group
San Francisco 1934-36

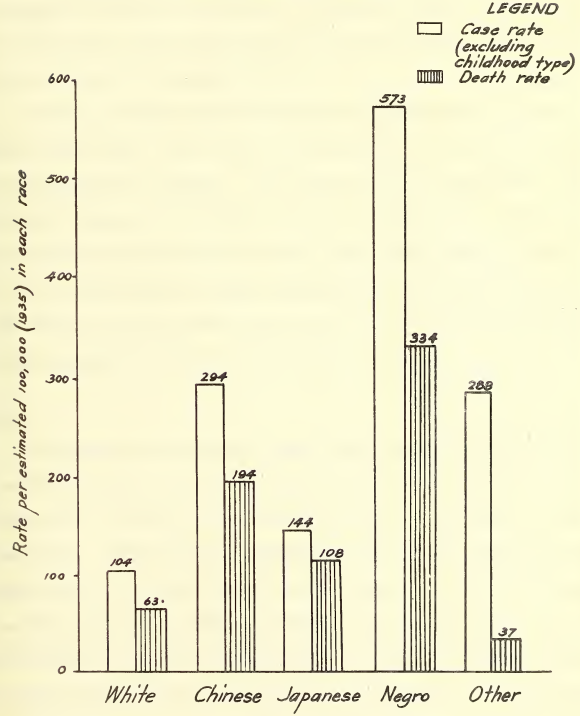


FIG. 22

death rate for whites. In spite of the distortion of the death rate for whites through the inclusion of Mexicans, comparison of tuberculosis death rates brings out the same racial differences in the incidence of tuberculosis as are indicated by morbidity rates.

The ratio of death rates to incidence rates discloses further variations between races. The ratio of the morbidity rate to the mortality rate is lowest among the Japanese. The Chinese have the second most unfavorable ratio between the morbidity rate and the death rate. The very favorable ratio between these rates for the "other" races probably is the result of the classification of deaths among Mexicans as white. Correspondingly, the ratio for white persons would be more favorable were all deaths among Mexicans separated from those among white persons.

Nativity:

No significant differences appear among cases reported relative to the nativity of white persons. 24 percent of all white tuberculosis cases were foreign born. In 1930, 26 percent of the total white population was of foreign birth. Native whites of mixed parentage and of foreign parentage contributed relatively the same proportions to cases of tuberculosis during 1934-36 as they did to the general population in 1930. Because of the lack of population data for the years studied it is difficult to analyze the influence of the country of origin with respect to the number of cases reported among persons who were foreign born or who were native born of mixed or foreign parentage. Computed on the basis of the actual population in 1930, persons with a central European background had a tuberculosis case rate of 80 per 100,000 estimated population which is considerably lower than the case rate

of any other nativity group. Persons of German extraction constitute the third largest nativity group in San Francisco (first, Irish; second, Italian) and virtually all cases classified as "central European" were from this stock. There is nothing to indicate that the low morbidity rate among this group is the result of under-reporting (or non-recognition) of cases of tuberculosis.

Summary:

1. The high ratio of reports of tuberculosis for children under 15 years to those for older persons which characterizes reports for non-white persons as contrasted with whites, indicates under-reporting (or non-recognition) of active tuberculosis among non-white adults.

2. Morbidity rates conform with mortality rates in indicating that the incidence of tuberculosis is greatest among Negroes and next greatest among the Chinese. The mortality rate for Negroes is five times that for whites; the rate for the Chinese is three times that for whites.

3. High incidence of tuberculosis among Mexicans is indicated by morbidity reports. Deaths do not accurately reflect incidence in this racial group because on death certificates Mexicans are sometimes returned as white.

4. Comparison of the mortality and the morbidity rates for each racial group indicates that under-reporting of cases is most marked among the Japanese.

5. White persons born in Germany or native born of German parentage have a slightly lower morbidity rate than do white persons in San Francisco of other foreign origin.

Residence

It is occasionally believed that San Francisco's position as a port and as a central market for migratory laborers results in many persons being reported for tuberculosis in this city who are not really residents. Analysis of cases of tuberculosis reported during 1934-36 does not bear this out. More than half of the entire group of persons had lived in San Fran-

cisco ten years or longer prior to the time of report for tuberculosis; only 7 percent had had less than one year's residence. 72 percent of all cases had lived in San Francisco five years or more. Males between the ages of 20 and 54 years are the group which might be expected to show the greatest degree of transiency, but only 9 per cent of even these had lived in the city less than one year. In each age group from 25 to 65 years a larger proportion of all male than of all female cases had lived in San Francisco less than five years prior to the time of report for tuberculosis. Other than this no significant difference appears between male and female cases with respect to length of residence in San Francisco.

Morbidity reports indicate marked differences in the incidence of tuberculosis in geographic subdivisions of the city. Assembly District #33 had a case rate of 267 per 100,000 estimated population in 1935, or more than four times the rate obtaining in some other sections of the city. 7/ Assembly District #33 contains the entire Chinese population, the poor Italian Colony and Telegraph Hill, one of San Francisco's oldest sections. This District is reputed to have the poorest housing conditions in the city. The Division of Housing of the Department of Public Health planned a demolition program for several areas within the 33rd Assembly District, but the depression halted the carrying out of this program. The second highest case rate, 230 per 100,000 estimated population, was in the 22nd Assembly District, which lies on the south side of Market Street and the East side of Eleventh, extending to the water front on the east and south. The area of this District is large

7/ San Francisco was redistricted in 1931. Since no population figures are available for the new districts, addresses of cases were classified according to Assembly Districts as they were in 1930. The population of each Assembly District was estimated by assuming that it was the same proportion of the total estimated population in 1935 as it had been of the actual total population in 1930. Cases of childhood type tuberculosis were included in determining rates for each district.

CHART III

GEOGRAPHICAL DISTRIBUTION OF TUBERCULOSIS CASES REPORTED TO THE SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH 1934-36

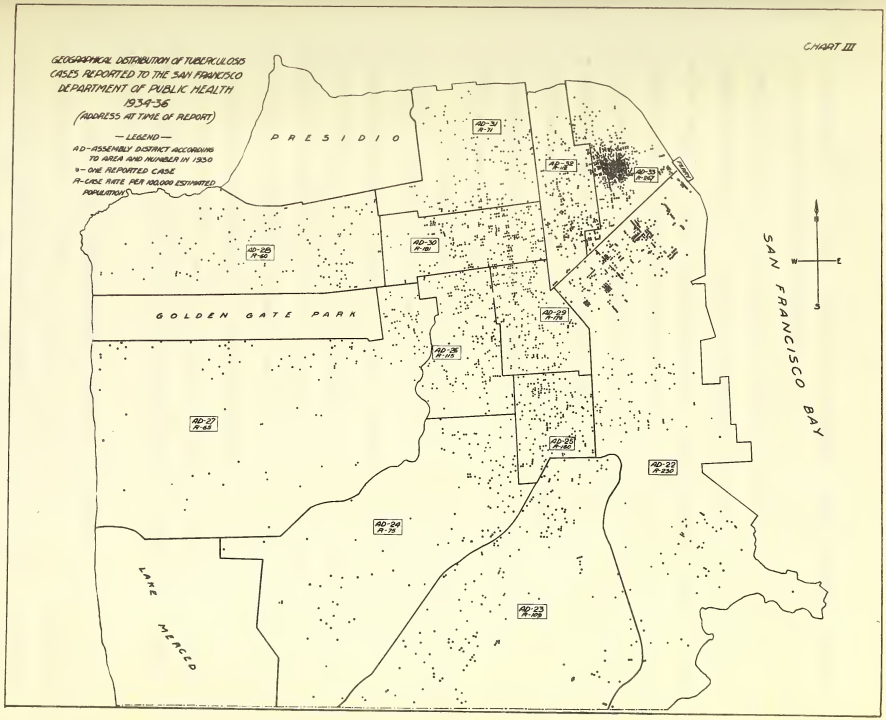
(ADDRESS AT TIME OF REPORT)

— LEGEND —

AD-ASSEMBLY DISTRICT according to AREA and NUMBER in 1930.

• - ONE REPORTED CASE

R-CASE RATE PER 100,000 ESTIMATED POPULATION



but much of it is used for industrial purposes, with residential sections only in the northern and in the southern ends of the District. The northern residential section is a small region bounded by Second and Sixth Streets, and by Market and Harrison. Here are concentrated the boarding houses and hotels which lodge the casual and semi-permanent laboring group of San Francisco. From Chart III it is apparent that most of the cases reported from the entire Assembly District are concentrated in this small section. The third highest case rate was found in Assembly District #30, in which live many Negroes, Japanese, Filipinos and Mexicans. Bounded by Van Ness and Parker, by Pine and McAllister, housing conditions and over-crowding are considered a serious problem in certain blocks within this District.

The tuberculosis case rate was lower in the more outlying Assembly Districts. In general, these have been developed more recently; they are less densely populated; housing is of newer construction; the proportion of separate dwellings is relatively much higher than in the downtown Districts. Six Districts reported fewer than 112 cases per 100,000 estimated population, which was less than one-half the number reported from the 22nd and 33rd Districts. The geographic variation may be even more pronounced than these figures indicate; it is the 30th and 33rd Districts which have the non-white population, among which under-reporting (or non-recognition) of tuberculosis seems to be greatest.

In 1925 the San Francisco Tuberculosis Association made a map showing the death rate in different sections of the city. Chart III showing morbidity rates for 1934-36 is almost a reproduction of the map made by the Tuberculosis Association in 1925 with respect to the relative incidence of tuberculosis in different sections.

The three Districts in San Francisco having the highest tuberculosis morbidity rates are the 22nd, 30th and 33rd. They differ in the composition of the population; the 22nd District is predominantly white, the 30th and the 33rd Districts contain most of the city's non-white population. The one feature common to these three Districts is that they contain blocks characterized by poor housing, bad sanitation and overcrowding. It has been suggested that the high incidence of tuberculosis among non-white races is a reflection of low economic and social status rather than the result of racial susceptibility. 8/

Summary:

1. More than half of all persons reported for tuberculosis during 1934-36 had been residents of San Francisco ten years or more prior to the time of report for tuberculosis. Only 7 percent had been in the city less than one year.

2. The 22nd and 33rd Assembly Districts (all Districts as of 1930) had tuberculosis morbidity rates of 230 and 267, respectively, per 100,000 estimated population in 1935. These rates were four times as high as those in the 27th and 28th Assembly Districts; and were more than twice the rates in the 23rd, 24th, 31st and 32nd Districts. The third highest morbidity rate, 181, was found in the 30th Assembly District.

3. The non-white population of San Francisco is concentrated in two of the three Assembly Districts which had the highest morbidity rates. All three are reputed to contain areas characterized by poor housing, bad sanitation and over-crowding.

4. The areas within San Francisco having the highest morbidity rates in 1934-36 are the same areas which had the highest tuberculosis death rates in 1925.

8/ Dublin, L. I., The Conquest of Tuberculosis, Harper's, April, 1929, p. 611.

Family Exposure

It has been said that tuberculosis is a disease which occurs in large part as a long continued household epidemic.[9/] If the 145 cases in which the size of household was unknown are deducted from the 2739 cases followed by the survey, and the 950 cases where the patient was living alone are similarly deducted, there remain 1644 cases in which the person reported for tuberculosis was domiciled with one or more other persons. For the purpose of this study, these 1644 cases may be considered as household units or families.

Table 4 - Households of Cases Reported, 1934-36, According to Size and the Number of Tuberculous Persons.

Number of Persons in the Household (including reported cases)	Number of Cases in Households Having a Given Number of Tuberculous Persons				
	All households	1 person	2 persons	3 persons	4 persons
All cases	2739	2458	217	46	18
1 person	950	950	-	-	-
2 persons	465	447	18	-	-
3 persons	345	305	36	4	-
4 persons	295	240	46	9	-
5 persons	213	167	33	5	8
6 persons	134	92	30	12	-
7 persons	82	45	20	8	9
8 persons & more	110	67	34	8	1
Unknown	145	145	-	-	-

In almost one out of every six of these 1644 cases, one or more individuals had tuberculosis in addition to the person followed by the survey. As might be expected, the larger the size of the household, the greater the number of households having more than one tuberculous person.

9/ McPhedran, F. and Opie, E., American Journal of Hygiene, 1935, Vol. 22, No. 3, p. 564.

Of the households containing more than four members, almost one out of every three included two or more tuberculous individuals. In the households of 18 cases, four persons had tuberculosis. No household contained more than four tuberculous persons.

In addition to the many households in which several persons in the household had tuberculosis, additional evidence of the spread of infection within families is afforded from the number of cases in which the person reported had had, previously, some member of his family or household die of tuberculosis. Deaths from tuberculosis were recorded as having occurred in the families of 326 of the cases studied. 11 of the cases reported during 1934-36 had had four or more such deaths. For 375 cases this information was unavailable. Difficulty is frequently encountered in obtaining accurate information concerning the family history of tuberculosis. It is likely that the number of deaths from tuberculosis which actually occurred in the families of the cases studied is greater than the number of deaths specified in available records.

IV THE DISPOSITION OF CASES AFTER INITIAL REPORT

The situation in February, 1937 of the 2739 cases reported for tuberculosis between January 1, 1934 and December 31, 1936 is shown in Table 5. At that time only 1256 cases, 46 percent of the original group, were living in San Francisco or were in an institution for tuberculosis. Almost all cases classified as "in an institution for tuberculosis" were institutionalized within the city limits. A few individuals were in sanatoriums outside of San Francisco but presumably they were to return to their homes in the city when discharged. Almost one out of every three of the 2739 cases had terminated in death, in all 962.[1/] Except in eleven instances the recorded cause of death was given as tuberculosis.

Of the surviving cases, 77 were re-diagnosed as non-tuberculous or as "observation". Known departures from San Francisco accounted for 257 cases. Intensive search of the available records in all the agencies contacted failed to disclose the whereabouts of 187 cases. These factors: death, departure, changed diagnosis and disappearance, combined to leave less than one-half (1256 cases) of the original group still under the supervision of a known physician, institution or health agency in San Francisco at the time of the study.

The shift which occurred within the total reported group is apparent when comparison is made of the recorded status of the same cases as between the date of initial report and as of the date of the survey. Of the cases of tuberculosis reported during 1934, almost one out of every two had died.

1/ In the preceding section reference to deaths from tuberculosis concerned all such deaths occurring during 1934-36 regardless of the year in which the person had been reported as a case.

36 percent of the cases reported in 1935, and 28 percent of those reported during 1936 were recorded as dead by February, 1937; using insurance terminology, the risk of a reported tuberculosis case is exceedingly high. Persons reported for tuberculosis in San Francisco only have an even chance of being alive two years after the time of report. Among the cases reported, a woman's chance of surviving for a period in excess of two years was slightly better than a man's chance.

Table 5 - Situation in February 1937 of Cases Reported, 1934-36.

Situation in February, 1937	Year Reported							
	1934-36		1934		1935		1936	
	No.	%	No.	%	No.	%	No.	%
All cases	2739	100.0	844	100.0	934	100.0	961	100.0
Living in San Francisco	809	29.5	233	27.6	295	31.6	281	29.2
In an institution for tuberculosis	447	16.3	58	6.9	118	12.6	271	28.2
Died of tuberculosis	951	34.7	342	40.5	339	36.3	270	28.1
Moved from San Francisco	257	9.4	87	10.3	97	10.4	73	7.6
Whereabouts unknown	187	6.9	90	10.7	61	6.5	36	3.7
Diagnosis Changed	77	2.8	29	3.4	21	2.3	27	2.8
Died of cause other than tuberculosis	11	.4	5	.6	3	.3	3	.4

As of February, 1937, the percentage of cases reported during each of the three preceding years which were still "alive" and resident in San Francisco is fairly uniform: 28 percent of cases reported in 1934; 32 percent of those reported in 1935; and 29 percent of 1936 cases.

There appears to be a correlation between deaths and institutionalized cases: deaths which occurred among cases reported each year from 1934 to 1936 decrease in proportion to the number of persons reported to be in institutions. This may be accounted for by the fact that a high percentage (28 percent) of the 1936 cases reported were institutionalized in February, 1937. However, only 13 percent of the cases reported in 1935 and 7 percent of those in 1934 were in an institution at that time.

The categories "died" and "in an institution" include most of the shifts in status which occurred within the group of cases studied. Persons who moved from the city constituted approximately one-tenth of all cases reported. Some cases apparently had withdrawn from all health supervision. These cases who could not be located formed only 4 percent of those reported during 1936, but 11 percent of the total reported during 1934. Changes in the original diagnosis of tuberculosis to "observation" and "discharged as non-tuberculous" eliminated 3 per cent of the original group.

The shift in status of cases reported for tuberculosis, both with respect to the amount of change and the direction it takes, may be considered to have significance in several ways for the program of tuberculosis control. It gives some indication of the effectiveness of the case-finding program. A second significance appears in relation to the type and amount of services which must be planned for on the basis of the known disposition of a year's group of tuberculosis reports. Still a third significance is found with respect to the specific problems in tuberculosis control presented by certain individuals within the group studied such as those cases who could not be located.

Cases Recorded as Dead From Tuberculosis

951 cases among the total reported during 1934-36 were recorded as dead from tuberculosis by February 15, 1937.[2/] It is likely that additional deaths occurred among persons classified as "whereabouts unknown" and "moved from San Francisco." Differences appear between the "living" and the "dead" cases with respect to age, sex, race and type of disease.

Table 6 - Cases Reported, 1934-36, by Age, Sex and by Whether Dead From Tuberculosis

Age in Years	Males			Females		
	Total	Dead from tuberculosis	Not dead from tuberculosis	Total	Dead from tuberculosis	Not dead from tuberculosis
All ages	1741	696	1045	998	255	743
Under 15	211	20	191	241	25	216
15 to 24	180	48	132	234	46	188
25 to 34	321	115	206	243	61	182
35 to 54	711	316	395	200	72	128
55 and over	314	194	120	76	51	25
Unknown	4	3	1	4	-	4
			Percent			
All ages	100.0	40.0	60.0	100.0	25.6	74.4
Under 15	100.0	9.5	90.5	100.0	10.4	89.6
15 to 24	100.0	26.7	73.3	100.0	19.7	80.3
25 to 34	100.0	35.8	64.2	100.0	25.1	74.9
35 to 54	100.0	44.4	55.6	100.0	36.0	64.0
55 and over	100.0	61.8	38.2	100.0	67.1	32.9
Unknown	100.0	75.0	25.0	100.0	-	100.0

Age and Sex:

17 percent of all persons who were under 5 years of age at the time of report died before February 15, 1937. Children included in the age

2/ For each decedent, the interval between report and death was determined by comparison of the date of death as entered on the death certificate with the date on which the first report card for tuberculosis had been made out.

group 5 to 9 years had a smaller percentage of deaths, 7 percent, but thereafter the percentage of deaths increases successively among persons reported in each age group. If cases of childhood type tuberculosis are excluded, the proportion of deaths among cases reported in each age group under 15 years is: under 5, 81 percent; 5 to 9, 65 percent; 10 to 14, 41 percent.

Almost two-thirds of all persons who were 55 years old or more at the time of report for tuberculosis were dead by February, 1937. Male mortality exceeded female mortality among cases reported in every age group, except those under 15 and over 54 years. Not only is the mortality of males between the ages of 25 and 54 years in excess over females but a larger percentage (59 percent) of all males than of all females (44 percent) reported for tuberculosis were in this age group.

Race or Color:

The percentage of all cases reported which terminated in death is approximately the same for white persons as for other races, 34.8 and 35.2, respectively. Within the non-white group, the Chinese, the Japanese and the "other" races each had approximately the same percentage of cases terminate in death. Mexicans had the most favorable mortality experience, only 25 percent of all Mexicans reported had died. Negroes had the highest ratio of deaths to living cases, one out of every two cases reported having died. The general significance of this apparent similarity in the mortality experience of white persons and non-white persons is qualified by the fact that 31 percent of all cases reported from the non-white races were under 15 years of age, whereas only 13 percent of all white cases were included in this age group. Because 84 per-

cent of all reports for cases under 15 years were for childhood type tuberculosis this age group has the smallest proportion of deaths. When cases are distributed according to color and age, marked differences appear between the mortality experience of whites and non-whites. In every age group the ratio of deaths to cases reported was distinctly higher for non-white persons. This excess of mortality among non-whites over whites is most marked at the age group 15 to 24; the percentage of deaths among non-whites is almost double that among whites. Within the non-white group, the low mortality experience among Mexican cases and the high mortality among Negroes may simply reflect the fact that 39 percent of all Mexicans reported were under 15 years of age, whereas only 15 percent of all Negroes were included in this age group.

Table 7 - Cases Reported, 1934-36, by Age, Race and by Whether Dead From Tuberculosis a/

Age in Years	Race or Color					
	White Cases			Non-white Cases		
	Total	Dead from tuberculosis	Not dead from tuberculosis	Total	Dead from tuberculosis	Not dead from tuberculosis
All ages	2192	762	1430	537	189	348
Under 15	285	28	257	165	17	148
15 to 24	315	60	255	99	34	65
25 to 34	442	127	315	118	49	69
35 to 54	782	321	461	125	67	58
55 and over	361	223	138	29	22	7
Unknown	7	3	4	1	-	1
			Percent			
All ages	100.0	34.8	65.2	100.0	35.2	64.8
Under 15	100.0	9.8	90.2	100.0	10.3	89.7
15 to 24	100.0	19.0	81.0	100.0	34.3	65.7
25 to 34	100.0	28.7	71.3	100.0	41.5	58.5
35 to 54	100.0	41.0	59.0	100.0	53.6	46.4
55 and over	100.0	61.8	38.2	100.0	75.9	24.1
Unknown	100.0	42.9	57.1	100.0	-	100.0

a/ Excludes 10 cases of unknown race.

The excess mortality among non-white cases over white cases complements the fact that tuberculosis mortality rates among the former are much higher than among the latter. It has already been suggested that late diagnosis may contribute to this excess mortality. A second factor which may account for the high tuberculosis mortality among non-white races is the hindrances which customs and language impose on the treatment of diagnosed cases. Housing conditions are a third factor which may contribute to the differential mortality between whites and non-whites. Light, ventilation and sufficient space are considered of great importance in the treatment and prevention of tuberculosis. It is the Chinese, Japanese, Mexicans and Negroes who, for the most part, live in the sections of the city considered to have the poorest housing and the most severe over-crowding.

Type of Disease:

Death occurred relatively more frequently among cases reported for non-pulmonary than for pulmonary tuberculosis. 39 percent of all cases reported for adult type pulmonary tuberculosis died before February 15, 1937. 65 percent of the cases reported for "other" forms of tuberculosis were dead. Among cases reported for adult type pulmonary tuberculosis during 1936, 32 percent were dead; death terminated 53 percent of the cases of "other" forms of the disease reported during the same year.

Summary:

1. Only 46 percent of all cases reported during 1934-36 were living in San Francisco or in an institution for tuberculosis in February, 1937. Deaths, departures, unlocated cases and changed diagnosis contributed, in the order listed, to the shift within the original group.

2. 41 percent of cases reported during 1934 were dead from tuberculosis by February 15, 1937; 36 percent of those reported during 1935; 28 percent of those reported during 1936.

3. Male mortality exceeded female mortality for cases reported at all ages except those under 15 and over 54 years of age. The excess male over female mortality was greatest at ages 25 to 44.

4. The proportion of deaths among cases reported in each age group increased steadily at successive ages from 7 percent of those between the ages of 5 and 9 years, to 65 percent of cases 65 years old and over.

5. The percentage of deaths recorded among cases reported in every age group was higher for non-white persons than for white persons.

6. Death occurred in 65 percent of the cases reported for non-pulmonary forms of tuberculosis; and in 39 percent of cases reported for adult type pulmonary disease.

Interval Between Report and Death:

To the individual, early diagnosis of tuberculosis is important because it improves his chance of recovery. To the community, early diagnosis and early reporting of cases of tuberculosis may be presumed to be important because the opportunity for limiting the spread of infection is thereby enhanced. In tuberculosis work, preventative measures are relatively inexpensive when compared with the tremendous cost of treating tuberculosis patients.[3/] Since much of this cost falls on public organizations, early diagnosis of cases is important to the community as a means of reducing the burden of medical care. Examination of the interval by which report preceded death for those cases followed by the survey who died gives some indication of the stage of disease at which cases were reported.

3/ Sawyer, W. S. and Richard, E. K., American Review of tuberculosis, Vol. 33, April, 1936, p. 574.

The average interval between report for tuberculosis and the time of the survey is longer for cases reported during 1934 than for those reported during 1935, and longer still than for cases reported during 1936. This difference between cases reported during each of the three years with respect to the length of time during which there had been opportunity for deaths to occur limits the comparisons which can be made of the proportion of deaths among each year's cases occurring at given intervals after report.

Table 8 - Deaths From Tuberculosis Among Cases Reported, 1934-36, by the Interval Between Report and Death and by Year Reported.

Interval by which report Preceded Death	Year Reported				
	1934-36		1934	1935	1936
	No.	%	No.	No.	No.
All deaths	951	100.0	342	339	270
Died before report	429	45.1	148	163	118
Under 1 month	178	18.7	48	52	78
1 month and under 8 months	199	20.9	74	60	65
8 months or longer	139	14.6	71	60	8
Unknown	6	.7	1	4	1

The percentage of the cases reported during each of the three years studied which died before report or within less than one month after report was found to be as follows: 23 percent of the cases reported during each of the years 1934 and 1935; 21 percent of cases reported during 1936. The number of reports of tuberculosis obtained from the daily list of deaths was as follows: in 1934, there were 75; in 1935, 115; in 1936, 77.

From Table 8 it can be seen that 45 percent of the 951 decedents had not been reported for tuberculosis prior to death. For an additional

19 percent, report proceded death by less than one month. It has been suggested in some studies that non-reporting of tuberculosis is more frequent among cases diagnosed and cared for by private physicians than when diagnosis and supervision are effected by some other medical authority. To the extent that this is true, non-reporting of cases may not be of significance in controlling the spread of infection. Presumably, however, agencies affiliated with or under the jurisdiction of the Department of Public Health comply with the provision of the law requiring a report on all persons diagnosed for tuberculosis.

552 (58 percent) of the 951 deaths from tuberculosis recorded among the cases studied occurred in the San Francisco Hospital, a municipal institution. Of these 552 decedents, 29 percent, had not been reported for tuberculosis prior to death. 136 more of these decedents, or 24 percent, died within less than one month after their first report for tuberculosis in San Francisco. 38 deaths recorded as from tuberculosis occurred in the Emergency Hospitals and in Laguna Honda Home, which also are maintained by the city. Of these decedents, 92 percent had not previously been reported for tuberculosis.

Among the cases studied, persons who died at home or in private hospitals were not reported for tuberculosis until after death much more frequently than was true of cases who died in municipal hospitals. 78 percent of the 118 deaths occurring in private hospitals for which tuberculosis was given as a cause had not previously been reported as cases. 72 percent of the 179 cases who died at home were not reported until after death.

It is unlikely that all deaths which occurred in private institutions and at home prior to report for tuberculosis represent non-report-

CHART IV

PLACE OF DEATH AND TIME INTERVAL BETWEEN REPORT AND DEATH

Deaths from tuberculosis among cases reported 1934-36

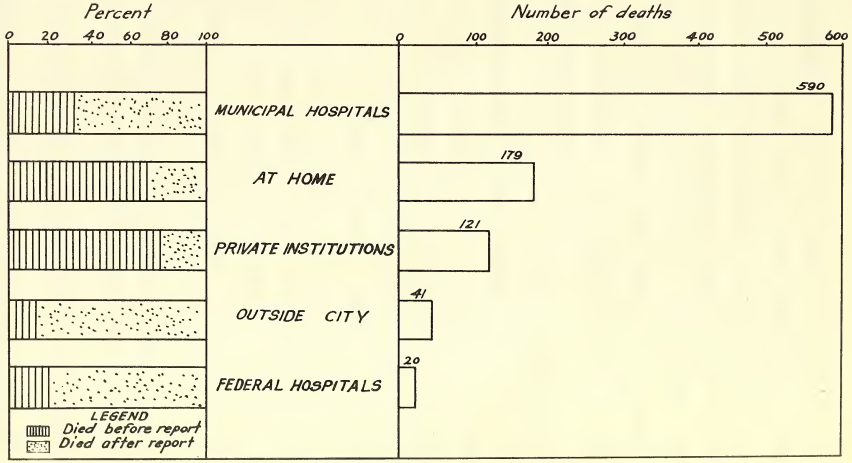


FIG. 41

ing rather than late diagnosis. If it is assumed that diagnosis and report for tuberculosis are nearly simultaneous for cases under care by official agencies then presumably where death occurred in a municipal institution before or shortly after report, the presence of infection had not been recognized until the disease was in an advanced stage. Cases of active tuberculosis not diagnosed until death are considered a major factor in the spread of tuberculosis infection. One investigator found that 26 percent of the adult contacts of cases dying at home had tuberculosis.[4/]

Among the cases studied, the interval between report for tuberculosis and death varied with the relief status of cases prior to report.[5/] Fifty-three percent (53%) of the deaths recorded among cases who had received relief were included in the category "died before or within 1 month after report", as compared with 68 percent of the deaths recorded among cases without any known history of relief. Thirty-nine percent (39%) of the 1596 cases who had not received material relief prior to report were dead by February 15, 1937, whereas only twenty-eight percent (28%) of the 1143 cases with relief experience were dead. These differences in the mortality experience of cases with and without a history of material relief hold true for cases reported during each of the three years studied.

Though the reporting of diagnosed cases of tuberculosis is apparently more complete for persons with relief experience than for those

4/ Barclay, W. S., American Review of Tuberculosis, Vol. 26, August, 1932, p. 192.

5/ Cases were classified as having received material relief only when they had received a formal grant of assistance from an organized public or private welfare agency. For the purpose of this study, aid from relatives, friends and fraternal organizations was not considered as "material relief" and cases receiving only this kind of aid were classified as "non-relief".

without such experience, it does not necessarily follow that recognition of disease is more complete among the former than among the latter. Presumably the 171 cases with relief experience who died before or within one month after report represent instances of non-diagnosis rather than non-reporting. It has been suggested that the relief population represents the group among which case-finding is most needed and most feasible. 6/

In addition to the implication of under-reporting of tuberculosis by private physicians and institutions, the different mortality experience of relief and non-relief persons may have a second significance. It is possible that persons in San Francisco not on relief but with incomes insufficient for periodic medical examination are less likely to be diagnosed as tuberculous until a terminal stage is reached than are persons on relief. A Central Medical Bureau is maintained jointly by the California Relief Administration and by the City of San Francisco to serve persons dependent on public relief. Though the Central Medical Bureau does not routinely examine all relief clients, many have received this service and all persons with any symptoms of tuberculosis are referred to a municipal tuberculosis clinic. Cases who died at home without previous report for tuberculosis more likely represent instances of non-diagnosis than non-reporting. 72 percent of the 179 cases included in this study who died at home had not been reported as cases. Only 22 percent of the cases who died at home had had a known relief experience.

Differences in the interval between report and death appear when decedents are classified according to age at the time of report. 82 percent

6/ Wisconsin Anti-Tuberculosis League; Finding Tuberculosis Among Apparently Healthy Adults; June,1937, Milwaukee, Wisconsin, Section 2, p. 4.

of all deaths recorded among cases under 15 years of age occurred before or within one month after report. Almost all deaths among children under 15 were caused by meningeal or disseminated tuberculosis, which are known to progress to death very rapidly. Though deaths among cases aged 15 to 24 were less concentrated in the category "died before or within 1 month after report" than were deaths among children, deaths among cases reported in every age group over 25 showed an increasing concentration in this category.

Table 9 - Deaths From Tuberculosis Among Cases Reported, 1934-36, by the Interval Between Report and Death and by Age.

Age in Years	All deaths	Interval by Which Report Preceded Death: Died before or within 1 month after report	1 month and under 8 months	8 months or longer	Unknown
All ages	951	607	199	139	6
Under 15	45	37	4	4	-
15 to 24	94	37	28	27	2
25 to 34	176	97	42	35	2
35 to 54	388	239	94	55	-
55 and over	245	194	31	18	2
Unknown	3	3	-	-	-
		Percent			
All ages	100.0	63.8	20.9	14.6	.7
Under 15	100.0	82.2	8.9	8.9	-
15 to 24	100.0	39.4	29.8	28.7	2.1
25 to 34	100.0	55.1	23.9	19.9	1.1
35 to 54	100.0	61.6	24.2	14.2	-
55 and over	100.0	79.2	12.7	7.3	.8
Unknown age	100.0	100.0	-	-	-

If cases of tuberculosis unreported before death represent non-reporting of infection rather than non-recognition thereof, then the proportion of deaths not previously reported as cases might be expected

CHART V
INTERVAL BETWEEN REPORT AND DEATH FOR CASES BY AGE GROUPS

Deaths from tuberculosis among cases reported 1934-1936

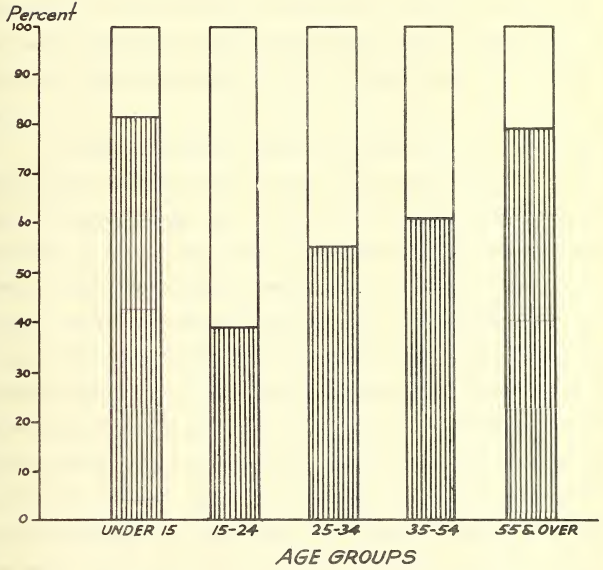


FIG. 45

to be approximately the same for deaths at all ages. The fact that deaths not previously reported as cases form an increasing proportion of all deaths recorded among cases reported in successive age groups indicates that at least some of the 607 persons who died before or within one month after report were unrecognized rather than unreported cases of tuberculosis. Unrecognized infections probably are most prevalent among persons of middle age.

A larger percentage of deaths from tuberculosis recorded among nonwhite persons occurred before or shortly after report than was true of deaths recorded among white persons. 64 percent of the latter took place before or within one month after report for tuberculosis. 77 percent of the 84 deaths recorded among Chinese cases were included in this category. No Chinese case who died had been reported longer than eight months. Of all races, deaths among Negroes were least concentrated in the category "died before or within 1 month after report" (46 percent). 22 percent of the 41 Negro decedents had been reported for tuberculosis eight months or longer. Only 17 percent of all white decedents had been reported as long as eight months prior to death. This relatively longer interval between report and death among Negroes as compared with other races is interesting in view of the comparatively high ratio of morbidity to mortality reports for Negroes which is apparent from Chart II.

It is occasionally assumed that many of the cases not diagnosed as tuberculous until shortly before or after death are persons who have resided in the city only a short time; or that they are from the group of casual and migratory workers referred to in Section III of this report. Examination of the deaths recorded among the cases studied neither supports nor

disproves this assumption.

There is no significant difference between male and female decedents with respect to the interval by which report preceded death. 79 percent of the 52 deaths recorded among cases who had lived in San Francisco less than one year occurred almost simultaneously with report. However, 64 percent of the 635 deaths recorded among cases who had been residents of the city ten years or more also occurred before or within one month after report. Deaths among persons engaged in different occupations show no significant variation with respect to the interval by which report for tuberculosis preceded death. Deaths among cases who were living alone took place almost simultaneously with report relatively more frequently than did deaths recorded among cases who lived with other individuals.

Table 10 - Deaths From Tuberculosis Among Cases Reported, 1934-36, by the Interval Between Report and Death and by Size of Household.

Number of Persons in the Household (including decedent)	Interval by Which Report Preceded Death							
	All deaths		Died before or within 1 month after report		1 month or longer		Unknown	
	No.	%	No.	%	No.	%	No.	%
All households	951	100.0	607	63.8	338	35.5	6	.7
1 person	421	100.0	292	69.4	129	30.6	-	-
2 persons	164	100.0	94	57.3	68	41.5	2	1.2
3 persons	102	100.0	51	50.0	48	47.1	3	2.9
4 persons	66	100.0	36	54.5	29	43.9	1	1.6
5 persons	51	100.0	23	45.1	28	54.9	-	-
6 persons and over	63	100.0	36	57.1	27	42.9	-	-
Unknown	84	100.0	75	89.3	9	10.7	-	-

Of the 607 cases recorded as dead before or within one month after report for tuberculosis, 292 lived alone. For 75 cases no information

could be obtained concerning the size of household. The 240 cases domiciled with other persons had a total of 619 known household contacts. Case records available in agencies cooperating in the study contained evidence that 341 of these known contacts had been examined for tuberculosis. Interpretation of what constituted examination was broad: a contact was considered to have been examined if a statement appeared in any record available to the study to the effect that an examination had taken place, regardless of whether the time, type or person performing the examination was stated. Available records contained no evidence that tuberculosis examinations had been made of 278 of the 619 known household contacts of cases who died before or within one month after report for tuberculosis. It has been suggested that perhaps the most important factor in the spread of tuberculosis infection is the adult contacts of terminal cases not diagnosed until shortly before death.

Summary:

1. The percentage of the cases reported during each of the three years studied which died before report or within less than one month after report was as follows: cases reported in 1934, 23 percent; in 1935, 23 percent; in 1936, 21 percent.

2. 64 percent of the 951 deaths recorded among cases reported took place before or less than one month after first report for tuberculosis.

3. 58 percent of all deaths among cases reported took place at the San Francisco Hospital.

4. 29 percent of the cases recorded as having died at the San Francisco Hospital had not been reported for tuberculosis prior to death; 72 percent of the cases who died at home had not previously been reported for tuberculosis; 78 percent of the decedents in private hospitals were unreported as cases.

5. The different mortality experience of those cases who had

received material relief prior to report for tuberculosis compared with those who had not indicates that the reporting of diagnosed cases of tuberculosis among persons with relief experience is more complete than for persons without relief experience; that persons not on relief but with income insufficient for regular medical care are perhaps less likely to be recognized as tuberculous than are persons on relief.

6. Deaths not previously reported as cases formed an increasing proportion of the deaths recorded among persons reported at successive ages, which indicates that non-recognition of cases as well as non-reporting contributed to the 607 persons not reported for tuberculosis until shortly before or after death. Undiagnosed infections probably are most prevalent among persons of middle age.

Cases Who Did Not Die From Tuberculosis

Cases Who Moved From San Francisco:

257 cases, or 9 percent of the 2739 cases studied, are known to have moved away from San Francisco. 10 percent of cases reported during each of the years 1934 and 1935, and 8 percent of cases reported in 1936 had left the city by February, 1937. 53 per cent of the cases who left the city were between the ages of 25 and 54. Among the 2739 cases reported, only 7 percent of those 15 years of age and over had been residents of San Francisco less than one year; among the cases who moved away after report, 27 percent of those over 15 had lived in the city less than one year. Relatively the same percentage of white and of non-white cases are known to have left the city. A larger percentage of cases without a known history of relief prior to report moved away than of cases with relief experience. Relatively more of the females reported than of the males are known to have left the city, but probably many departures from the city are included in the group of cases who could not be located. In this group males predominated.

Unlocated Cases:

187 cases, or 7 percent of the entire group, could not be located in February, 1937. White cases and non-white cases did not differ with respect to the percentage which had disappeared. Similarly as among cases who had left the city, cases known to have received material relief prior to report for tuberculosis were under-represented in the category "unlocated cases" compared to the proportion which they contributed to the total cases reported. A larger percentage of all male than of all female cases could not be traced. 93 percent of the cases who could not be located were over 15 years of age. Their residence history does not indicate ineligibility for municipal medical care as a reason for their disappearance; only 10 percent of these 187 cases had lived in San Francisco less than one year prior to report for tuberculosis; half had lived in the city more than five years prior to report. Approximately one-third of the 2739 cases studied lived as single persons, whereas almost half of those who could not be traced had been living alone when last seen by a private physician or municipal health agency. 81 of the cases who disappeared had been parts of households containing a total of 182 contacts at the time of last known interview. In all but a few instances the household contacts as well as the case could not be found.

Changed Diagnosis:

74 cases, or 3 percent of all those studied, were discharged as not having tuberculosis. The number of such recorded discharges did not differ significantly for cases reported during each of the three

years. Relatively more cases reported under 15 years were recorded discharged as non-tuberculous than was true of cases over 15 years of age. Of the 74 discharged, 53 were pronounced non-tuberculous within less than six months after the original report for tuberculosis. Changes in diagnosis were made more quickly for adult cases than for children. White cases and non-white cases did not differ significantly with respect to the percentage of cases which were discharged as non-tuberculous. In addition to the 74 cases pronounced non-tuberculous, three cases were reclassified as "observation" cases.

Cases Living in San Francisco:

Deaths, departures, changed diagnoses and unlocated cases accounted for more than half of the 2739 cases reported during the years 1934-36. In February, 1937, 809 cases from the original group were living in San Francisco; 447 others were in an institution for tuberculosis. The factors which operated to reduce the original group of reported cases were effective principally among cases over 15 years of age. Persons under 15 comprised 28 percent of all cases living in San Francisco or in an institution in February, 1937, whereas they had contributed only 17 percent of the original group of reported cases.

V MEDICAL FACTORS AFFECTING THE INCIDENCE AND CARE OF TUBERCULOSIS IN SAN FRANCISCO.

Though many private and public organizations in San Francisco are engaged in what might be called anti-tuberculosis work, responsibility for the control of tuberculosis rests with the Bureau of Communicable Diseases of the San Francisco Department of Public Health. This Bureau directs the programs for case finding, clinical service, field nursing service and institutional care.

Existing Facilities for Treating Tuberculosis

Case Finding:

"Case finding" is the diagnosis of hitherto unsuspected cases of tuberculosis. Medical examination of persons who have been in contact with known cases of active tuberculosis and of persons who have physical symptoms indicative of tuberculosis leads to the discovery of new cases. Tuberculin testing of school children accompanied by follow-up of reactors is also used as a case finding technique. It was indicated in section III of this report that case finding in San Francisco falls short of the standard of 2 new cases per annual death.[1/] The proportion of cases who died shortly after report for tuberculosis indicates the need of finding cases at an earlier stage of the disease.

1/ This standard, and all others referred to in this section, have been developed by the National Tuberculosis Association and the American Public Health Association. National Tuberculosis Association: Appraisal Form for Local Tuberculosis Activities, 1936.

Clinical Service:

During the period studied five clinics for the treatment of tuberculosis were maintained under the jurisdiction of the San Francisco Department of Public Health. The tuberculosis clinic in the San Francisco Hospital, a municipal institution, accounted for almost two-thirds of the visits to all five clinics. A tuberculosis clinic is located in each of the Mt. Zion, Stanford and University of California Hospitals. These three clinics in private hospitals are used to provide training for medical students, and each is operated by the regular staff of the hospital which works in co-operation with the Health Department. The Telegraph Hill Chest Clinic, which served the Chinese section, was combined with the San Francisco Hospital Chest Clinic in May, 1937.[2/] All services at the San Francisco Hospital Chest Clinic are free. Patients attending the Stanford, Mt. Zion and University of California Chest Clinics pay a small fee if their means permit; if not, they are treated without charge.

Judged by the standards of the National Tuberculosis Association, clinic facilities available in San Francisco during the years 1934-37 measured as follows:[3/]

2/ The municipal tuberculosis clinics are called "chest" clinics. They have no connection with the Community Chest.

3/ Data used in applying standards were obtained from the annual reports of the San Francisco Chest Clinic, the San Francisco Hospital, Hassler Health Farm and the Tuberculosis Unit of the Field Nursing Division of the Department of Public Health. Data applies to fiscal years ending June 30th.

Test #1. Standard: 15 clinic visits per annual death.

Performance: during 1934-35, 207 percent of standard; 1935-36, 215 percent of standard; 1936-37, 270 percent of standard.

Test #2: Standard; 2 clinic visits per individual patient attending last year.

Performance: during 1934-35, 101 percent of standard; 1935-36, 101 percent of standard; 1936-37, 97 percent of standard.

Test #3. Standard: 3 contacts examined per new positive case registered at the clinic.

Performance: during 1934-35, 75 percent of standard; 1935-36, 76 percent of standard; 1936-37, 63 percent of standard.

In addition to services available in the municipal tuberculosis clinics, some tuberculosis cases are cared for in the out-patient departments of the of the U. S. Marine and the Southern Pacific Hospitals. The Children's Hospital treats tuberculous children in its clinic. The number of tuberculous patients cared for in these clinics is probably not 5 percent of the number treated in the municipal tuberculosis clinics.

Field Nursing Service:

A special tuberculosis unit is maintained within the Division of Field Nursing of the San Francisco Department of Public Health. Nine nurses, including one supervisor, were on the staff of this unit during the years 1934-36. Four areas within the city are organized into Health Center districts. Tuberculosis cases in these districts are supervised by

the generalized nursing staff of the Health Centers. During the period studied, the nurses in the Tuberculosis Unit carried about twice as many tuberculosis cases as were cared for by the staff of the Health Centers. The only free field nursing service available to tuberculosis patients in San Francisco is that provided by the Department of Public Health. Measured by the National Tuberculosis Association test, field nursing service available during the years 1934-37 rated as follows:

Standard: 50 visits to or in behalf of tuberculosis cases per annual death.

Performance: during 1934-35, 45 per cent of standard; 1935-36, 77 percent of standard; 1936-37, 89 percent of standard.

The average caseload carried by nurses in the Tuberculosis Unit during the period studied was as follows: during 1934-35, 202 cases; 1935-36, 191 cases; 1936-37, 217 cases. Considering the large size of these caseloads the number of nursing visits, though below the standard, is a tribute to the activity of the staff of the Tuberculosis Unit.

For the fiscal year ending June 30, 1936, $71,736.00 was allowed in the Health Department budget for all tuberculosis activities other than institutional care. Though this represented an increase of approximately 13 percent over the amount which had been allowed during the fiscal year ending June 30, 1934, this increase in funds does not seem to have kept pace with the extension of the problem of tuberculosis control which had taken place during the years of depression. Clinic facilities were augmented during 1934-36.

Institutional Care:

The San Francisco Hospital has a tuberculosis division. The Medical Policy is supervised by the Director of the Bureau of Communicable Diseases of the San Francisco Department of Public Health. The Tuberculosis Hospital is equipped to treat cases in any stage of tuberculosis, including cases needing surgery. Hassler Health Farm, a municipal institution located about 30 miles from San Francisco, provides sanatorium and convalescent care for tuberculosis cases. The Director of the Bureau of Communicable Diseases also directs the medical policy at this institution. The Laguna Honda Home, a city institution for the aged, accepts some arrested tuberculosis patients. The U. S. Marine Hospital and the Letterman General Hospital provide institutional care for the relatively few San Francisco Tuberculosis cases who are eligible for Federal hospitalization. Several private tuberculosis sanatoriums near the City are available to the limited number of San Francisco patients who can afford this type of care.

During the period studied, the combined facilities of the San Francisco Tuberculosis Hospital and the Hassler Health Farm fell short of the standard set by the National Tuberculosis Association.

Standard: 2 hospital beds for tuberculosis per annual death.

Performance: during 1934-35, 57 percent of standard; in 1935-36, 60 percent of standard; in 1936-37, 64 percent of standard. 4/

During the years 1934-36 there was almost continuously a waiting list for admission to the San Francisco Tuberculosis Hospital.

4/ Beds not open for occupancy were not included in the count of available hospital beds.

In addition to this shortage of beds, its location in the center of the city makes the San Francisco Hospital somewhat unsuitable for the treatment of semi-ambulant patients and for the treatment of elderly single men whose sputum is only intermittently positive. In other communities, such men have been placed in an institution which was removed from the city and which offered opportunities for work. The number of beds at Hassler Health Farm is so limited that only cases discharged from the San Francisco Tuberculosis Hospital can be accepted there for sanatorium or convalescent care. Minimal cases, not requiring complete hospital care, but who could be benefited by sanatorium care are unable to obtain it.

There is no preventorium or sanatorium treatment for children, except the facilities of the San Francisco Hospital. Hill Farm and Stanford Convalescent Home, Community Chest agencies, accept non-tuberculous children under 14 years of age. Only a few of the many children needing preventorium care can be placed in these Homes.

Both with respect to the number of beds and the type of institutional care, present facilities in San Francisco fall short of the standards which have been suggested as necessary for adequately treating and preventing tuberculosis. The tremendous cost of caring for tuberculosis cases is evidenced by the fact that, inadequate though it was, hospital care for tuberculosis patients accounted for almost 48 percent of all days of hospital care provided in municipal institutions (San Francisco Hospital and Hassler Health Farm) during the years 1934-37.[5/]

5/ Data obtained from the annual reports of the San Francisco Hospital and the Hassler Health Farm.

The inadequacy of institutional facilities assumes particular significance in view of the tremendous cost which non-prevention of tuberculosis places upon San Francisco.

School Health Services:

During the period studied, "health" classes were maintained in four public schools for the benefit of elementary school pupils needing special physical care. These "health" classes provide hot lunches, rest periods, health lectures and medical examinations. Many of the children who are in contact with tuberculosis are in these "health" classes; other tuberculosis contacts who are in ordinary schools receive special attention from the school nurses. These health services available through the school system augment the work of tuberculosis control.

Health Education:

The San Francisco Tuberculosis Association plays a vital role in the anti-tuberculosis campaign. It carries on a continuous program of health education through the distribution of books and pamphlets, through lectures and through the exhibition of motion pictures. The Tuberculosis Association also performs a valuable service in subsidizing the care of a limited number of patients in private sanatoriums.

Summary:

1. Clinical facilities for the treatment of tuberculosis in San Francisco during the years 1934-37 exceeded the standards established by the National Tuberculosis and the American Public Health Associations.6/

6/ Fiscal years ending June 30th.

2. Field nursing service and institutional facilities available for the treatment of tuberculosis in San Francisco during the years 1934-37 were below the standards established by the National Tuberculosis and the American Public Health Association.7/

Services Received by Tuberculosis Cases and Contacts.

Examination of Contacts:

Medical examination of persons known to have been in contact with diagnosed cases of tuberculosis is accepted as a first step in the program for preventing this disease. When a new case of tuberculosis is diagnosed in one of the municipal clinics, a nurse from the Department of Public Health visits all persons in contact with the diagnosed case and urges them to be examined for tuberculosis. Any person may have a free examination in the municipal clinics. When a new case of tuberculosis is reported by a private physician, a nurse from the Health Department telephones the reporting physician and asks whether the contacts have been examined for tuberculosis. The physician's statements concerning the total number of contacts and the number who have been examined is entered on a "short service" card which is then filed in the field nurse's office. The nurse also asks the physician's permission to visit the home of the newly diagnosed patient.

An attempt was made to determine how many of the household contacts of cases reported during the years 1934-36 had been examined for tuberculosis. For the purpose of this study a household contact was considered to have been examined if any record available in agencies participating in

7/ Fiscal years ending June 30th.

the study contained a statement to the effect that an examination had taken place, regardless of whether the time, type or person performing the examination was specified. Statements by private physicians that contacts had been examined were accepted without reference to what had constituted the examination.

1644 of the 2739 cases reported for tuberculosis during 1934-36 were recorded as living in households with other persons at the time of report. Even using so liberal an interpretation of the content of an examination, medical examination of the entire household was not recorded for 859 (52 percent) of the 1644 cases. Relatively more of the adult contacts than of the child contacts were not examined. The households of 1299 cases were reported to contain contacts who were over 15 years of age; for 681 (52 percent) of these cases the records indicated that one or more of the adult contacts in the household had not been examined. 729 cases of the total reported during the period studied lived in households containing one or more persons aged under 15 years; for 147 (20 percent) of these cases the records indicated that one or more of the children had not been examined. For 145 cases reported during 1934-36, no information had been recorded concerning the number and examination of household contacts.

Several things probably contributed to the fact that no tuberculosis examination was recorded for so large a number of the household contacts of diagnosed cases. The records contain many reports of contacts who, either through fear or ignorance, refused to be examined. Difficulty in effecting examination of contacts was often noted in the case records of patients with a foreign background. It has been suggested that frequent

changing of clinicians handling individual families lessens cooperation. Until July 1, 1937, the San Francisco Hospital Chest Clinic was used for training medical students and this involved constant changing of clinicians The three tuberculosis clinics in private hospitals continue to be staffed with medical students.

Little information could be obtained about the cases and contacts reported by private physicians and not under the care of a field nurse. There is no follow-up on these cases other than the telephone call which the field nurse makes to the private physician at the time the case is reported. Questionnaires sent to private physicians brought replies which were not consistent with entries on the original report cards concerning the number of contacts or concerning the number thereof who had been examined. Evidence of examination for tuberculosis could be obtained for relatively fewer of the household contacts of cases reported by private physicians than for the contacts of cases diagnosed in clinics or municipal institutions.

Institutional Care After Report:

Information concerning the source, amount and recency of health services received by tuberculosis cases was obtained only for the group of 1256 cases who, of the 2739 reported during 1934-36, were recorded as living in San Francisco or as in an institution in February, 1937. The discussion in the remainder of this section applies only to this group of 1256 cases.

Institutional care after report was recorded for 880 (70 percent) of the 1256 cases who, among the total studied, were living in San Francisco

or who were in an institution in February, 1937. A single hospital or sanatorium experience between the date of report for tuberculosis and February 15, 1937, was recorded for 621 cases, or 71 percent of the 880 for whom institutional care was recorded. 113 cases (13 percent) had both a sanatorium and a hospital experience. 146 cases (17 percent) were reported to have had multiple experience other than the combination of one hospital and one sanatorium, including 34 cases for whom four or more institutional admissions were recorded.

Cases reported during each of the three years studied must be considered separately in relation to the amount of institutional care which was received after report. Direct comparisons between cases reported in individual years are invalid because of differences in the length of time during which there was opportunity for institutional experience to have occurred.

Table 11 - Length of Institutional Experience After Report for Cases Living in San Francisco or in an Institution in February, 1937, Among Cases Reported, 1934-36.

Number of Months Institutionalized After Report	Year Reported							
	1934-36		1934		1935		1936	
	No.	%	No.	%	No.	%	No.	%
All Cases	1256	100.00	291	100.00	413	100.00	552	100.00
Under 1 month	43	3.42	20	6.87	13	3.15	10	1.81
1 mo. & under 4 mos.	202	16.08	25	8.59	49	11.86	128	23.19
4 mos. & under 8 mos.	221	17.60	34	11.68	61	14.77	126	22.83
8 mos. & under 1 yr.	150	11.94	23	7.90	37	8.96	90	16.30
1 yr. & under 2 yrs.	182	14.49	44	15.12	121	29.30	17	3.08
2 yrs. and over	52	4.14	47	16.15	5	1.21	-	-
No institutional experience	305	24.28	68	23.37	93	22.52	144	26.09
Unknown a/	101	8.05	30	10.32	34	8.23	37	6.70

a/ Includes 30 cases for whom institutional care was recorded, but for whom the length of such care could not be determined.

291 of the cases reported during 1934 were residing in San Francisco or were in an institution in February, 1937. No institutional care subsequent to report for tuberculosis was recorded for 23 per cent of these 291 cases. 7 percent were recorded as having been in a tuberculosis hospital for a period of less than one month after report. This group probably includes cases who had been hospitalized for some time, but who were not reported for tuberculosis until shortly before discharge. The records indicated that 9 percent received between one and four months hospital care after report. Though such a short period of institutional care may be adequate for minimal cases, the percentage of cases which received no institutional care (23 percent) and the number of cases constantly awaiting admission to the San Francisco Tuberculosis Hospital indicated that probably only more advanced cases were hospitalized. Even allowing for the relatively short period of hospitalization which may suffice when pneumo-thorax is used, adequate treatment of advanced cases usually is considered to require hospitalization for a period longer than four months. The tremendous cost of treating advanced cases of tuberculosis is indicated by the fact that 15 percent of the 291 cases reported during 1934 who were residing in San Francisco or were in an institution in February, 1937, had been hospitalized from one to two years and an additional 16 percent had spent more than two years in an institution subsequent to report for tuberculosis.

413 of the cases reported during 1935 were residing in San Francisco or were in an institution in February, 1937. The percentage (23 percent) of these 413 cases for which no institutional care after report

was recorded was approximately the same as the percentage of the corresponding group of cases among those reported during 1934. Over 30 percent of this group of 413 cases reported during 1935 had spent over one year in an institution for tuberculosis between the time of report and February 15, 1937.

Of the cases reported during 1936, 552 were living in San Francisco or were in an institution at the time of the study. No institutional experience subsequent to report was recorded for 26 percent of these 552 cases. Four months or more of hospital care between the time of report in 1936 and February 15, 1937 was recorded for 42 per cent.

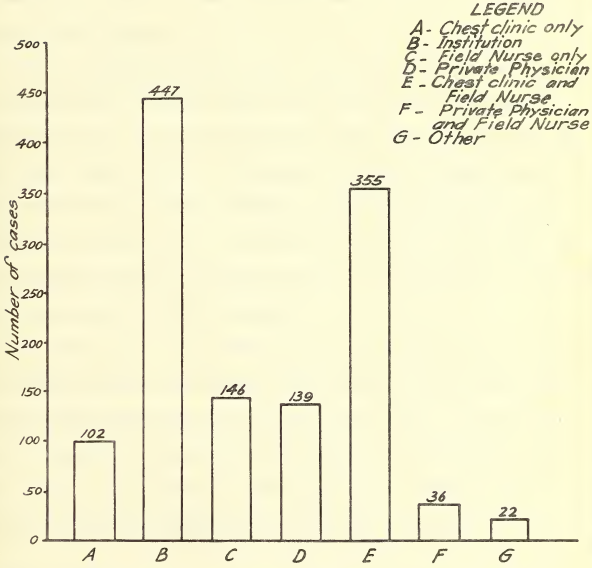
Source of Health Supervision:

Of the 447 cases who in February, 1937, were in institutions under treatment for tuberculosis, 5 percent were in Federal Hospitals; 8 percent were in private hospitals and sanatoriums; and 87 percent were in municipal institutions. Tuberculosis patients in San Francisco are admitted to a municipal hospital only when their need for free care has been clearly established.

Not only were the majority of the cases receiving institutional treatment dependent on the city for care, but so also were most of the 809 cases living at large in San Francisco. (See Chart VI.) Of these, 639 (79 percent) were receiving some form of medical supervision through the Department of Public Health: the Health Department was the only source of treatment for 74 percent; 5 percent were supervised by a private physician with the assistance of a field nurse from the Department. In addition to these instances of cooperative supervision, 139 (17 percent) of

CHART VI
SOURCE OF HEALTH SUPERVISION WHEN LAST INTERVIEWED

Cases living in San Francisco February 1937
among cases reported 1934-36 (a)



(a) 9 cases excluded whose supervision was unknown

FIG. 65

the 809 cases residing in San Francisco were under the exclusive care of private physicians. 22 cases (3 percent) classified as receiving "other" supervision included cases attending clinics at the Southern Pacific Hospital, the U. S. Marine Hospital and at the Children's Hospital, as well as a few nurses (reported as cases) who were receiving medical care at the hospitals in which they were on duty.

Data in records available to this study indicated that 636 (79 percent) of the 809 cases residing in San Francisco had been interviewed by some medical or health (nurse) representative within three months prior to the time of the study. For 79 (10 percent) of these 809 cases, the last recorded interview with a health or medical representative had occurred from three to six months prior to the time of the study. For 42 cases (5 percent) recorded information indicated that more than six months had elapsed since the last medical or health treatment.

545 (85 percent) of the 639 cases who were receiving some form of supervision from the Health Department were recorded as having been interviewed within three months prior to the time of the study. Information concerning the date of last interview could not be obtained for 44 of the 139 cases cared for exclusively by private physicians, therefore these cases were not distributed according to the recency of examination.

Clinic Visits, Nursing Visits and X-rays:

Of the 809 cases who, among the total studied were residing in San Francisco (not in an institution) in February, 1937, 639 cases were under the supervision of the Health Department. The average number of each type of service, - clinic visits, field nurse interviews and X-rays -

recorded for these cases by the Health Department is shown in Table 12. Only services rendered between the date of report for tuberculosis and February 15, 1937, were included in computing the averages given in Table 12.

Table 12 - Clinic Visits, Nursing Visits and X-rays After Report for 639 Cases Supervised by the Health Department, Among Cases Reported, 1934-36.

Year Case was Reported	Number of Cases served	Average Number of Each service received per case		
		Clinic visits	Field Nurse visits a/	X-rays
1934-36	639	-	-	-
1934	182	9.2	15.4	3.7
1935	233	7.2	10.8	2.9
1936	224	4.0	6.4	1.8

a/ Attempted but uncompleted visits not included.

Hospital care was recorded for 356 (56 percent) of the 639 cases included in Table 12.

1528 household contacts were reported for the 639 cases included in Table 12. In Table 13 is given the number of municipal clinic visits and the number of nursing calls in the home recorded for these 1528 contacts between the date that the case was first reported for tuberculosis and February 15, 1937.

Table 13 - Clinic and Nursing Visits After Report for 1528 Contacts of 639 Cases Supervised by the Health Department, Among Cases Reported, 1934-36.

Number of Services Received Between Report and February 15, 1937	1934		1935		1936	
	No.	%	No.	%	No.	%
Total contacts	428	100.0	555	100.0	545	100.0
Clinic visits	-	-	-	-	-	-
1 to 4	173	40.5	254	45.8	278	51.0
5 to 9	67	15.7	68	12.3	28	5.1
10 to 14	19	4.4	15	2.7	-	-
15 to 19	1	.2	-	-	-	-
20 or more	1	.2	2	.3	-	-
None	167	39.0	216	38.9	239	43.9
Field nurse visits [a/]	-	-	-	-	-	-
1 to 9	71	16.6	233	42.0	400	73.4
10 to 19	168	39.2	257	46.3	93	17.1
20 to 29	111	25.9	39	7.0	4	.7
30 to 39	45	10.5	7	1.3	4	.7
40 or more	25	5.9	2	.3	-	-
None	8	1.9	17	3.1	44	8.1

a/ Attempted but uncompleted visits not included.

Though no visit to a municipal tuberculosis clinic was recorded for 41 per cent of the 1528 contacts, all but 5 percent had been interviewed by a field nurse from the Health Department. For 1007 (66 percent) of these contacts there was no record that an X-ray had been made in the Health Department's X-ray laboratory. For the remaining 521 contacts the average number of X-rays recorded in the laboratory files of the Health Department was found to be as follows:

Year case was reported	Average number of X-rays per contact served
1934	1.6
1935	1.5
1936	1.2

5 or more X-rays were recorded for each of 8 contacts.

The 447 cases in institutions in February, 1937 and the 170 cases in San Francisco who were not under the care of the Health Department had 1075 recorded household contacts. Detailed information concerning the receipt of health services was not obtained for these contacts, but it was evident that many were dependent on the Department of Public Health for the supervision and treatment necessary to prevent them from becoming tuberculous.

Summary:

1. Household contacts were recorded for 1644 of the 2739 cases reported during 1934-36. Medical examination of all household contacts was not recorded for 52 percent of these 1644 cases.

2. 1256 cases among the 2739 reported during 1934-36 were recorded as resident in San Francisco or as in an institution for tuberculosis in February, 1937. Institutional treatment for tuberculosis was reported for 70 percent of these 1256 cases.

3. 447 cases among the 2739 reported during 1934-36 were recorded as in an institution in February, 1937. Of these 447 cases, 5 percent were in Federal hospitals; 8 percent were in private hospitals and sanatoriums; 87 percent were in municipal hospitals.

4. 809 cases among the 2739 reported during 1934-36 were recorded as resident in San Francisco in February, 1937. 639 (79 percent) of these 809 cases were receiving some form of supervision from the Health Department.

5. The 639 cases referred to above were recorded to have received the following services from the Health Department between the date of report for tuberculosis and February, 1937; 182 reported during 1934 each received an average of 3.7 x-rays; 15.4 visits from a field nurse; 9.2 clinic treatments. 233 cases reported during 1935 each received an average of 2.9 x-rays; 10.8 visits from a field nurse; 7.2 clinic treatments. 224 cases reported during 1936 each received an average of 1.8 x-rays; 6.4 visits from a field nurse; 4.0 clinic treatments.

6. 1528 household contacts were reported for the 639 cases. No municipal tuberculosis clinic treatment was recorded for 41 percent of these contacts; no interview with a Health Department field nurse was recorded for 5 percent; no x-ray had been made in the Health Department Laboratory for 66 percent.

VI SOCIO-ECONOMIC FACTORS AFFECTING THE INCIDENCE AND CARE OF TUBERCULOSIS IN SAN FRANCISCO.

Socio-economic factors are accepted generally as having considerable influence on the incidence and on the treatment of tuberculosis. Presumably, then, the socio-economic status of persons in San Francisco reported for tuberculosis indicates factors which must be dealt with in attempting to control tuberculosis in this city.

Occupation

A positive relationship between certain occupations and the development of tuberculosis is acknowledged widely. Some occupations involve hazards directly conducive to the development of tuberculosis. The highest tuberculosis death rates are found among persons in occupations involving exposure to stone dust (miners, stone cutters, glass workers and others); and to organic dust (furniture and wood workers, textile mill workers, hat workers, bakers, and others). Relatively few of the gainfully employed persons in San Francisco are in occupations involving exposure to stone or to organic dust.

Low income occupations, (e. g., in the sweated trades) by determining the level of existence, often lead to the development of tuberculosis on the job as well as in the home. Work under conditions of high heat and high humidity, coupled with alternate exposure to cold probably accounts for the high tuberculosis death rate which has been found among laundry workers. High tuberculosis death rates have been found in occupations not associated with serious industrial risk but which involve confinement and poor ventilation (tailors and clothing workers). Many of the Chinese in San Francisco are employed in laundries and in sweated industries such as clothing.

Table 14 - Occupation According to Race for Cases Aged 15 Years and Over Among Cases Reported, 1934-36 a/

Occupation Prior to Report	Race or Color						
	All races a/		White		Non-white		Tuberculosis death rate per 100,000 employed a/
	No.	%	No.	%	No.	%	
All occupations	2271	100.0	1900	100.0	371	100.0	-
Professional persons	80	3.5	70	3.7	10	2.7	26.2
Proprietors, managers and officials	86	3.8	78	4.1	8	2.1	43.2
Clerks, salesmen and kindred workers	337	14.8	317	16.8	20	5.4	65.8
Farmers and farm laborers	24	1.0	16	.8	8	2.2	46.5
Skilled workers and foremen	222	9.8	216	11.4	6	1.6	72.1
Semi-skilled workers	285	12.6	243	12.7	42	11.4	102.1
In manufacture	74	3.3	56	2.9	18	4.9	105.0
Other	211	9.3	187	9.8	24	6.5	95.0
Unskilled workers	644	28.4	471	24.8	173	46.6	184.9
Servant class	330	14.6	207	10.9	123	33.1	173.3
Other	314	13.8	264	13.9	50	13.5	-
No gainful occupation	509	22.4	424	22.3	85	22.9	-
Unknown	84	3.7	65	3.4	19	5.1	-

a/ Excludes 8 cases over 15 years of age whose race was unknown.

b/ Whitney, Jessamine: Death Rates by Occupation, National Tuberculosis Association, June, 1934, Table 8, Page 32. Death rates based on deaths from respiratory tuberculosis only.

The relationship between occupation, apart from specific hazards, and tuberculosis mortality is indicated by a study of occupational death rates based on data of the U. S. Census Bureau.[1] All occupations were grouped into seven socio-economic classes, in the highest of which the standard of living is

1/ Whitney, Jessamine: Death rates by occupation, National Tuberculosis Association, June, 1934.

presumably the best. The tuberculosis mortality rates for each class disclosed by the study are given in the last column of Table 11. From these rates it is apparent that tuberculosis becomes increasingly fatal in each succeeding lower economic class.

In Table 11, cases reported for tuberculosis in San Francisco are distributed according to the occupation usually followed prior to report. Because of the limitations of the data, tuberculosis morbidity rates by occupation could not be computed, but the concentration of reports among cases engaged in unskilled and semi-skilled work is apparent. 55 percent of the 1680 cases reported as gainfully occupied (including 2 cases of unknown race) were unskilled or semi-skilled workers.

Among the cases studied, there is a distinct difference in the occupational distribution of whites and non-whites. Of the non-white cases aged 15 years or more, 47 percent were unskilled workers as contrasted with 25 percent of white cases. This concentration of non-white cases in the occupational group which has the highest death rate from tuberculosis indicates an environmental factor which may contribute to the high rate of tuberculosis mortality and morbidity among non-white races. 33 percent of the non-white cases worked at occupations included in the category "servant class"; only 11 percent of the whites were similarly engaged.

1392 (91 percent) of all male cases aged 15 years or more were recorded as having a gainful occupation prior to report. Of these 1392 cases, 57 percent were unskilled or semi-skilled workers. Of the 288 women recorded as working prior to the time when reported for tuberculosis, 30 percent had been employed as servants; 39 percent were engaged in clerical or sales work.

Presumably cases of tuberculosis cared for but unreported by

private physicians were engaged in skilled and professional pursuits relatively more frequently than were reported cases. Even allowing for this bias, the occupational distribution of the cases of tuberculosis reported during 1934-36 indicates a high incidence of tuberculosis among persons engaged in occupations usually accompanied by a low standard of living.

A second significant implication of the occupational distribution of reported cases concerns the hazards to the community inherent in the type of work done by persons with tuberculosis. The occupational category "servant class" includes cooks and waiters, who probably constitute the greatest danger in the spread of infection. House servants, home laundresses, and nurse maids also are included in the category "servant class" and these represent a source of infection second only to cooks and waiters. Of the 331 cases (including 1 case of unknown race) reported for tuberculosis who were included in the occupational category "servant class", 135 were dead by February, 1937. 78 of those who died were not reported for tuberculosis until after death or until less than one month before death.

The necessity for preventing infection brings out the need for special attention to the control of tuberculosis among all employees whose work brings them into close contact with people. Laws requiring periodic examination of food handlers in restaurants might be extended to other persons engaged in domestic or personal service.

Tuberculosis is, perhaps, the most expensive of all diseases to treat. The occupational distribution of the cases reported during the years 1934-36 indicates that the majority were from that portion of the population

which frequently is unable to finance even ordinary illnesses, let alone the institutional care, surgery, period of bed rest, and special diet required in the treatment of tuberculosis.[2/] So long as tuberculosis is not prevented, the cost of caring for tuberculous persons will, for the most part, fall on the community. Support of the family during the wage earner's period of incapacitation is still another charge which this disease frequently places upon the community as evidenced by the number of tuberculosis cases reported from families of relief status.

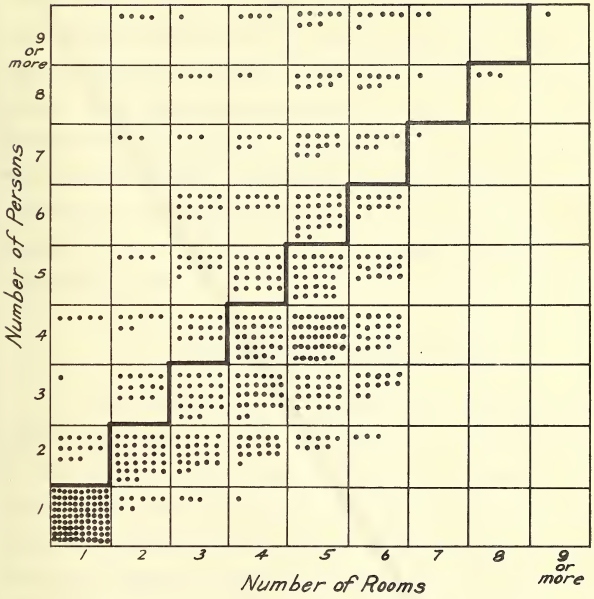
The interruption of employment which tuberculosis effects is evidenced by the small percentage of the total cases reported during 1934-36 who were working at the time of the study. Of the 1680 persons who had been gainfully occupied prior to report only 141 were recorded as employed in February, 1937.

Housing

Adequate housing usually is considered an important tool in controlling the spread of tuberculosis. Housing involving not more than one person per room is generally accepted to be of good standard with respect to overcrowding. Data on housing conditions was sought only for the 809 cases who, from the 2739 reported during 1934-36, were living in San Francisco (not in an institution) at the time of the study. Available records contained no information concerning the number of rooms in the households of 180 of these cases. Of the remaining 629 cases, 35 percent were housed under conditions involving more than one person per room.

2/ Falk, I. S., Klem, M. C., and Sinai, N.: The Incidence of Illness and the Receipt and Cost of Medical Care Among Representative Families, University of Chicago Press, Chicago, Illinois, 1933.

CHART VII
FAMILY SIZE AND NUMBER OF ROOMS FOR 629 CASES
Among cases reported 1934-36



LEGEND

• Represents one case
— Above line: More than one person per room
Below line: One person or less per room

FIG. 76

Failure to meet the standard of one person per room occurred relatively more frequently among households containing over five persons than among those of smaller size. The degree of overcrowding in the home is a factor which influences admissions to the municipal tuberculosis hospital. If it had been possible to include housing data for the families of the 447 cases who were in an institution at the time of the study, the percentage of cases in which the housing standard of one person per room was not met probably would have been greater. The data indicated that isolation in the home was impossible for many of the cases studied. Unless the diseased person was hospitalized, spread of infection within the household was difficult if not impossible to control.

Registrations with Welfare Agencies

The assistance rendered by public and private welfare organizations also gives some evidence of the effect of social and economic status on tuberculosis. For the purpose of this study, an individual was considered to have shared in any service rendered to the household of which he was a part; classification of cases was made according to this assumption. The service rendered was determined by checking all cases against the records of the Social Service Exchange. 42 percent of the 2739 cases had at some time been dependent on relief agencies for food, shelter and clothing. In addition to the cases who had received this material relief, 40 percent had been dependent on welfare agencies for assistance with social and health problems. Altogether, 82 percent of the 2739 cases studied had at some time been active with one or more social agencies in San Francisco.

727 cases (27 percent) among the total studied were first active with a social agency between one and four years prior to report for tuberculosis. 767 cases (28 percent) had their first experience with a welfare agency more than four years prior to report which, even for most of the cases reported during 1936, would have been before the general increase in the number of persons on relief which occurred during 1932.

Table 15 - Number of Welfare Agencies to Which Cases Reported During 1934-36 or Their Households Were Known.

Number of Welfare Agencies to Which Patient or Household was Known	Whereabouts of Patient in February, 1937.							
	All cases	Living in San Francisco	In an institution	Discharged as non-T.B.	Died of T.B.	Moved from S.F.	Whereabouts unknown	Other
All cases	2739	809	447	74	951	257	187	14
1 agency	384	73	59	6	166	54	25	1
2 agencies	410	90	84	13	148	38	34	3
3 agencies	367	102	66	8	125	37	26	3
4 agencies	332	105	64	4	96	36	25	2
5 agencies	229	87	40	10	55	23	14	-
6 agencies	167	64	33	6	43	10	10	1
7 and more	355	172	64	17	69	15	17	1
None	495	116	37	10	249	44	36	3
			Percent					
All cases	100.0	29.5	16.3	2.7	34.7	9.4	6.8	.6
1 agency	100.0	19.0	15.4	1.6	43.2	14.1	6.5	.2
2 agencies	100.0	21.9	20.5	3.2	36.1	9.3	8.3	.7
3 agencies	100.0	27.8	18.0	2.2	34.1	10.1	7.0	.8
4 agencies	100.0	31.6	19.3	1.2	28.9	10.8	7.6	.6
5 agencies	100.0	38.0	17.5	4.4	24.0	10.0	6.1	-
6 agencies	100.0	38.3	19.8	3.6	25.7	6.0	6.0	.6
7 and more	100.0	48.4	18.0	4.8	19.4	4.2	4.8	.4
None	100.0	23.4	7.5	2.0	50.3	8.9	7.3	.6

750 cases (27 percent) were not registered with a social agency until during or after the year in which they were reported for tuberculosis. For cases reported during 1934, the large number (32 percent) who first

became active with a welfare agency during that year or in the years following may in part reflect the same socio-economic conditions which gave rise to the increase in the number of relief cases among the general population during 1934 and 1935. The number of persons on relief in the general population during 1936 was smaller than in 1935, yet 21 percent of all cases reported for tuberculosis in 1936 had their first experience with a welfare agency during that year. The large percentage of cases in which first experience with a welfare agency occurs almost simultaneously with report for tuberculosis indicates to some extent that self-supporting families became dependent upon community agencies primarily because of the occurrence of tuberculosis within the family.

That individual cases became active with many civic agencies is brought out in Table 12. Of the 2244 cases among the total reported who were known to a welfare agency, 1450 cases (65 percent) had received service from three or more different organizations. 751 (33 percent) of the cases were registered with five or more agencies. These numerous registrations are not surprising to one familiar with tuberculosis cases since it reflects what happens when a member of a low income family group become tuberculous. The following sequence of events occurred among many of the cases studied; because of his illness the wage earner was unable to work and was forced to seek material relief from a welfare organization, almost invariably a public agency. Frequently the patient needed hospitalization. Being unable to provide this himself, he was cared for, perhaps, by the San Francisco Tuberculosis Hospital. A third agency was involved when the household contacts went to a public clinic for medical examination and continuing supervision. Sometimes the home situation was such as to require

the removal of a child to a foster home. At that point the family was registered by a fourth organization, - a children's agency. To supplement relief for food and other necessities rendered by the public relief agency, the stricken family may appeal for aid from a fifth and sixth agency, often these are private agencies supported by Community Chest funds.

Though to some extent registration with any social agency indicates dependence on community resources, the economic status of the cases studied is more clearly indicated by the number of cases who had to rely on civic organizations for food, shelter and other necessities. As was stated in Section IV of this report, only cases who received a formal grant of assistance from an organized agency were classified as having received material relief. 42 percent of the cases (or their households) reported for tuberculosis during 1934, 1935 and 1936 were recorded to have received material relief prior to the time of report for tuberculosis. The percentage of dependent cases would have been considerably greater if aid from friends, relatives and fraternal organizations had been considered as material relief. The significance of this high ratio of relief to non-relief cases within the group studied is qualified by the fact that under-reporting of tuberculosis is apparently greatest among persons cared for by private physicians who, because they are attended by a private physician, presumably, are non-relief cases.

Relief occurred relatively more frequently among cases reported from large households than among those in small households. The percentage of households of different size which had received material relief was found to be as follows:

Family size	Percent of total which received relief
1 to 3 persons	37 percent
4 to 6 persons	56 percent
7 or more persons	66 percent

Though this greater incidence of relief among large households as compared with small probably is but a reflection of the same socio-economic conditions which necessitated providing relief for the general population, it is significant with respect to the problem of controlling tuberculosis. The opportunity for the spread of infection is greater in large families than in small; it is generally agreed that isolation in the home, or removal of the infected person from the home is necessary. Yet unless assisted by the community, large families are able to provide this segregation relatively less frequently than are small families.

Among the households of cases followed by the survey 16 percent of those which had received material relief contained two or more tuberculous individuals. Multiple infection was found in the households of only 6 percent of the cases who had been self-supporting.

Summary:

1. The occupational distribution of cases of tuberculosis reported during 1934-36 indicates a high incidence of tuberculosis among persons engaged in occupations usually accompanied by a low standard of living. 55 percent of the 1680 cases reported as gainfully occupied were unskilled or semi-skilled workers.

2. Of the non-white cases aged 15 years or more, 47 percent were unskilled workers as contrasted with 25 percent of white cases. This concentration of non-white cases in the occupational group which has the highest death rate from tuberculosis indicates an environmental factor which may contribute to the high incidence of tuberculosis among non-white races.

3. The need for special attention to the control of tuberculosis among all employees whose work brings them into close contact with people is indicated by the fact that

330 of the total cases studied were included in the occupational category "servant class." Among these 330 cases, were included 78 who died before or within one month after first report for tuberculosis.

4. The many cases for whom isolation at home was virtually impossible emphasizes the importance of hospitalization of infected persons as a tool in preventing the spread of tuberculosis as well as in its therapy.

5. 1143 (42 percent) of the 2739 cases studied had at some time been dependent on relief agencies for food, shelter or other necessities. An additional 40 percent had been dependent on welfare agencies for assistance with social or health problems. Of these 2244 cases, 65 percent had received service from three or more different organizations.

6. The occupational background of cases of tuberculosis reported during the years 1934-36 and the extent to which these cases were dependent on welfare agencies indicates that a large number of the cases studied were of low economic status, and that they were unable to finance their own treatment for tuberculosis. Presumably, if medical treatment for these cases and preventative supervision for their contacts is not provided they will represent uncontrolled sources of infection to the community.

Appendix 1

METHOD OF CONDUCTING THE STUDY

Statistics concerning tuberculosis have, for the most part, been based on tuberculosis mortality. Mortality has been analyzed rather than morbidity because of the relatively more accurate reporting of the former. However, the very success with which tuberculosis is being controlled would seem to require a greater statistical emphasis on morbidity records since the prolongation of life and the reduction of fatalities among tuberculous patients make mortality records increasingly unrepresentative of the incidence and trend of tuberculosis. Morbidity records yield more data of a socio-economic character than can be obtained from death records. Since such data were a primary concern of this study, the work was based on morbidity reports, though not without realization of the limitations which must be observed in interpreting morbidity statistics.

Sources of Data:

Because the policy of the San Francisco Department of Public Health and the regulations of the Works Progress Administration discourage the interviewing of private individuals, the information to be gathered by the survey and the procedure for obtaining it had to be determined by considering (1) the persons, agencies and institutions from which data could be obtained; and (2) the items of information uniformly available therefrom.

A trial schedule was filled in for two hundred cases. Experience with this trial schedule was analyzed in order to determine concerning each

item of information (1) the frequency with which it was obtainable from the several agencies; (2) the consistency with which it had been reported originally in each agency's records; (3) the extent to which the reporting of the item was comparable among the several agencies. Many questions, obviously important in the study of tuberculosis, had to be omitted because experience with the trial schedules showed that they were reported incompletely, unreliably or required a large amount of interpretation on the part of the investigator.

Identification of the Sample:

In California tuberculosis is a reportable disease. The San Francisco Department of Public Health has a separate tuberculosis unit within the Bureau of Communicable Diseases. The Bureau makes a weekly list of all persons reported for tuberculosis. These lists are the basis of the official tuberculosis statistics released by the San Francisco Department of Public Health. For each case appearing on these lists for the years 1934, 1935 and 1936, a control card was prepared specifying address, age, type of disease, and week reported. The cards were alphabetized and duplications eliminated. Next, they were matched with the card file of tuberculosis cases kept by the Bureau of Communicable Diseases to identify those who had died. This was verified by checking a ten percent sample against death certificates.

The next step was to determine the sources of information available concerning each case included in the study. Because of the number of agencies which had to be canvassed, the operation of identifying sources of information was divorced from that of filling-in schedules. Each control card was matched against the files of agencies in San Francisco caring for

persons having tuberculosis. The name of the agency and the case number (or other reference) was entered on the control card for each source of information discovered, and the card was successively re-routed until sources likely to yield all the information called for by the schedule had been identified. Over half the cases were readily identified in the files of one of the five Chest Clinics under the jurisdiction of the Health Department or in the files of the tuberculosis unit of the Department's Field Nursing Service. The remainder of the cases had to be checked against the files of from one to fifteen agencies and institutions in order to determine the whereabouts of case history data. When no other source of information could be found, a questionnaire was sent to the physician who originally reported the case to the Department of Public Health. All cases were cleared with The Social Service Exchange.

Filling of Schedules:

Schedules were issued from control cards and were routed to the various sources of information noted thereon until all available data had been obtained. Investigators were trained in the survey office and assigned to work in the several agencies. The filling of schedules by means of transcription from existing records was accomplished by difficulties not encountered in a survey conducted by the interview method. Special care had to be taken to resolve conflicts and inconsistencies in information which were inevitable because of the many sources from which data was obtained for each case.

The agencies, institutions and persons (in San Francisco, unless specified otherwise) from whose records information was obtained for the filling of schedules are:

San Francisco Department of Health

Bureau of Communicable Diseases

Chest Clinics:
- Lane Stanford Hospital
- Mt. Zion Hospital
- San Francisco Hospital
- Telegraph Hill
- University of California Hospital

Field Nursing Division:
- Tuberculosis Unit

Health Centers:
- Alemany
- Chinese
- Civic Center
- Mission

Institutions:
- Hassler Health Home
- Laguna Honda Home
- San Francisco Hospital
  1. Main Hospital
  2. Tuberculosis Hospital

Other Clinics

Childrens Hospital Chest Clinic
Southern Pacific Hospital Out-Patient Clinic
U. S. Marine Hospital Out-Patient Clinic

Federal Hospitals

Letterman General
U. S. Marine
U. S. Veterans' at Fort Miley

Private Hospitals:

Childrens'
Franklin
French
Lane Stanford
Mt. Zion
Southern Pacific
Sutter
University of California

Private Sanatoriums:

Arequipa (Marin County, Cal.)
California (Belmont, Cal.)
Oaks (Los Gatos, Cal.)

Private Physicians:

128 physicians

Miscellaneous:

Death certificates
Eureka Benevolent Society
San Francisco Tuberculosis Association
Social Service Exchange
State Relief Administration

Tabulation:

All schedules completed in the field were reviewed by two trained editors; no schedule was accepted for tabulation until it had been verified for accuracy, completeness and consistency. Data on schedules were coded and the codes transferred to individual cards. Certain items were expressed on the code cards by a series of marginal holes which made possible group sorting of these items.

Tuberculosis Survey - Bureau of Communicable Diseases
San Francisco Department of Health

Survey no._____

A.Clinic_____case no._____
B.Field nurse_____
C.Health center_____case no._____
D.Hospital_____
E.Physician:name_____
address_____
F.Other (specify)_____

1.Name_____
Last First Middle
2.Address (present)_____
3.Week registered_____
4.Registration add._____
5.Check: Local_____Non-local_____

6.Date of birth_____7.Race(✓) W__Neg__Mex__Ch__Jap__Fil__Other(specify)_____
mo. yr.
8.Birthplace(give state or foreign country)
a.patient_____
b.father_____
c.mother_____

9.Length of patient's residence in
a.United States___yrs
b.California___yrs
c.San Francisco___yrs

10.Sex_____
11.Marital status (✓)
___a.sin ___d. div
___b.mar ___e. sep
___c.wid

12.Type of tuberculosis(✓)
___a.pulmonary,adult)
___b.pulmonary,childhood) childhood type
___c.pulmonary, adult
___d.other (specify)

13.Diagnostic findings(✓)

Type	Pos (1)	neg (2)	n.a. (3)
a.Sputum			
b.X-Ray			

14. Status of disease (✓)
___a.arrested
___b.improved
___c.no improvement
___d.died of T.B. (date)_____
___e.died of cause other than T.B
___f.discharged as non-T.B.
___g.other (specify)

15. Present location of living patient(✓)
___a. living in San Francisco
___b. moved away from San Francisco
___c. whereabouts unknown
___d. institution (name_____)
___e. other (specify)

16. Supervision of patient (enter all which apply)

	Name (1)	Address or case no. (2)	Date of last interview(3)
a.	clinic		
b.	field nurse		
c.	health center		
d.	hospital		
e.	priv. doctor		
f.	visiting nurse assn.		
g.	other (specify)		

17. If private doctor cares for patient, is this care free?(✓) a.yes__b.no__c.n.a.

18. If private doctor cares for contacts,is this care free?(✓) a.yes__b.no__c.n.a.

19. For each hospital,sanatorium,nursing home or other institution caring for tuberculosis to which the patient was admitted, enter

Name of Institution(1)	Date patient admitted(2)	Date patient discharged(3)
a.		
b.		
c.		
d.		

20.Check types of care recommended for patient
___a. special diet
___b. bed confinement
___c. no employment
___d. medicine and tonics
___e. hospitalization (include sanatoria nursing homes,etc.)
___f. surgery
___g. pneumothorax
___h. other (specify)

T8-8

21. Patient's employment (page 2)

Up to time of registration — Last since registration

a. Occupation _____ c. _____

b. Industry _____ d. _____

22. If now unemployed give month and year of last recorded employment _____

23. Members of household (exclude patient)

Name	Relationship to patient (2)	Month and year of birth (3)	Examined for T.B.? check (4) yes	no	n.a.	If T.B. enter yr. regist'd. (5)	Date of last known interview by Agency (6)	mo.yr (7)
a.								
b.								
c.								
d.								
e.								
f.								
g.								
h.								
i.								

23. (cont) Date of last known interview by

	Agency (8)	mo. yr. (9)	Agency (10)	mo.yr. (11)	Agency (12)	mo. yr. (13)
a.						
b.						
c.						
d.						
e.						
f.						
g.						
h.						
i.						

24. For each member of patient's family or household who is known to have died of T.B. enter

	Relationship (1)	Year of death (2)
a.		
b.		
c.		
d.		
e.		

25. Type of housing (✓)

__a. house __d. apartment __g. other (specify)

__b. cottage __e. flat

__c. room __f. hotel

26. Number of rooms ____

27. Number of sleeping rooms ____

28. Amount of rent monthly ____

29. Was patient (or patient's household) receiving material relief prior to or at the time of registration? (✓)

a. yes__; (name of agency _____ case no. _____) b.no.__ c.n.a.__

30. Is patient (or patient's household) now receiving material relief? (✓)

__a. yes (enter: agency _____ case no. _____)

__b. no

__c. n.a.

31. Identification

a. mother's maiden name

b. wife's maiden name

c. maiden name

d. other (specify)

Remarks

Source	Date filled	Inv's.number

T8-8

Appendix 2

SELECTION OF THE SAMPLE

The weekly list of cases reported for tuberculosis which is prepared by the Bureau of Communicable Diseases of the San Francisco Department of Public Health includes all persons for whom a notification of tuberculosis is received as well as persons not previously reported whose names are taken from the list of tuberculosis deaths occurring in the city. Each case reported is classified as "Local" or "Non-local" according to whether the onset of the disease is judged to have occurred in San Francisco or elsewhere. As used, " Local " and "Non-local" refer only to the place where the onset of infection occurred and has no reference to legal residence or to the person's whereabouts at the time he is reported for tuberculosis.

Tabulations of the number of tuberculosis cases reported in San Francisco which are made by the Division of Statistics of the San Francisco Department of Public Health include only the "Local" cases, that is, only those cases among the total reported who are judged to have been infected while living in San Francisco. In a city such as San Francisco, which is a focal point for considerable migration, persons who have developed tuberculosis within the city represent something less than the total group toward which the program of tuberculosis control must be directed. Decision as to which cases out of the total reported during 1934-36 were to be included in this study was based on the principle that any tuberculous person who had lived in San Francisco had contributed to the problem of community control of tuberculosis regardless of his place of legal residence or of the place where infection occurred. The study included all cases classified as "Local" as well as some classified as "Non-local" by the Bureau of Communicable Diseases.

Appendix Table I - Cases of Tuberculosis Reported to the San Francisco Department of Health, 1934-36, but Excluded from the Study.

Year Reported	Total cases reported	Cases included in the study	Cases Excluded from the Study			
			Total	Non-residents in Federal Hospitals	Non-resident patients of S.F.doctors	Exchange patients
1934-36	3177	2739	438	218	53	167
1934	984	84	140	70	16	54
1935	1090	934	156	76	21	59
1936	1103	961	142	72	16	54

Appendix Table I indicates which cases were not followed by the study. They fall into three groups: first are those persons who were eligible for medical care in Federal institutions in San Francisco and who came to the city to obtain this care. The second group is comprised of persons who received medical treatment for tuberculosis from a San Francisco physician while continuing to maintain residence outside the city. In certain instances, county hospitals and sanatoria in California exchange tuberculous patients in order to make most effective use of their specialized resources. Such "exchange patients" accepted from other counties for a limited period of care in the San Francisco Hospital form the third group of cases not followed by the survey.

To summarize: Application of the principle that, for the years studied, all persons reported for tuberculosis who had lived in San Francisco should be followed by the study regardless of the place of their infection and of their legal residence resulted in:

1. Inclusion in the study of all cases of tuberculosis reported to the San Francisco Department of Public Health during the years 1934, 1935 and

1936 who were classified as "Local" by the Bureau of Communicable Diseases and who were included in the official total of reported cases released by the department;

2. Inclusion in the study of some reported cases who were classified by the Bureau of Communicable Diseases as "Non-local" and who had not been counted in the Health Department's statistics on cases reported;

3. Exclusion from the study of some reported cases who were classified by the Bureau of Communicable Diseases as "Non-local" and who had not been counted in the Health Department's statistics on cases reported.

Appendix 3

THE METHOD USED FOR ESTIMATING POPULATION

The last enumeration made of the population of San Francisco is the U. S. census of 1930. Since the survey covered cases of tuberculosis reported during 1934, 1935 and 1936, tuberculosis case rates could not be computed without making estimates of the city's population. Four different methods of estimating population in San Francisco have been employed by various organizations. Of these, it was decided to follow the estimation formula of the U. S. Bureau of the Census in computing population estimates for this study.

Following is a brief description of each of the four methods which have been used for estimating San Francisco's population and a comparison of the totals arrived at thereby.

San Francisco Chamber of Commerce:

Since the 1930 census the San Francisco Chamber of Commerce has revised its original method of estimating population. The present method is based on a study of population trends in San Francisco since 1900. Through studying these trends the Chamber arrived at 22.9 percent of the 1930 population as the total expected increase in San Francisco's population between 1930-40. The annual estimate is based upon the spread of this percent increase. In determining the percent increase for each year the Chamber is guided by several factors such as economic conditions in the community, public school enrollment figures, construction of new residential quarters, and anticipated business activity. The estimated population arrived at by this method is considerably larger than the estimates obtained by the use of other methods.

Arithmetic Progression Method:

The actual increase of population between the 1920 and 1930 census is used as a basis for the determination of annual and monthly increments in population. The increase in the population of San Francisco from January 1, 1920, to April 1, 1930 was 127,718, or an annual increment of 12,460. Assuming this number to be the annual increment in San Francisco during the decade 1930-40, estimates for each year of the current decennial can be obtained.

California Taxpayers' Association:

This organization bases its estimates of population on the assumption that school enrollment figures furnish a fairly reliable indication of population trends. It has been established that about 96 percent of children pass from one grade to another at the end of each school year. By applying this percentage, the expected enrollment for each grade can be obtained. The difference between the actual and expected enrollment is ascribed to annual migration into the locality. By determining the percentage gain in school enrollment caused by migration, applying this percentage to the population determined by the previous U. S. census and then adding the actual excess of births over deaths the estimated population for any particular year is obtained.

U. S. Bureau of the Census:

During the decade 1920-1930, the U. S. Bureau of the Census used the arithmetic progression formula to estimate population. This formula is not used by the Bureau for estimating population since 1930, because tests have indicated that estimates arrived at by this method

are too high. The Census Bureau is making estimates based on the number of births and deaths and the net immigration or emigration since the time of the 1930 census. A detailed description of the method and a mathematical statement of the formula for estimating the population for any year appear in a release issued by the Bureau of the Census on February 12, 1936.

The four estimates of the total population of the County of San Francisco are as follows:

	1934	1935	1936
San Francisco Chamber of Commerce	695,930	710,536	725,141
Arithmetic Progression	675,014	687,474	699,934
Bureau of the Census	663,216	669,915	676,711
California Taxpayers'	655,460	673,960	673,080

There is fair conformity between the estimates of the Bureau of the Census and those of the California Taxpayers' Association, though the estimates are based on different factors. The estimates of the San Francisco Chamber of Commerce and those arrived at by the method of arithmetic progression do not conform to each other and both are markedly higher than the two other estimates.